

Appendix C Archaeological Inventory Survey Research Design

This appendix provides the research design developed for this project and previously presented in Sections 7 and 9 of the Archaeological Inventory Survey Plan (Hammatt and Shideler 2011). The research design has been updated to address all changes in test excavation locations that have occurred since the AISP was reviewed and approved by SHPD.

The archaeological inventory survey plan (AISP) identifies the research design developed for the Airport Section 3 archaeological inventory survey (Hammatt and Shideler 2011). The AISP, including the research design was approved by SHPD on December 2, 2011 (Log No. 2011.2167, Doc. No. 1211NN01). This research design is summarized below while changes to the AISP sampling strategy—primarily the relocation and addition of test excavation locations in response to utility and redesign concerns—are described in Volume 1.

Research Design

A research design is essentially a plan that clearly identifies:

- 1) what is currently known about the research subject,
- 2) the research objective or objectives,
- 3) the research investigation steps and methods that will collect the needed information to fulfill the research objective, and
- 4) how the results of the investigation will be interpreted and evaluated.

This research design was developed in consideration of what is currently known about the archaeological record in the vicinity of the Airport Section 3 study area. It also is based on the specific engineering/construction requirements and footprint of the Airport Section 3 portion of the Honolulu High-Capacity Transit Corridor Project (HHCTCP). Important considerations in the development of this research design are: (1) the Airport Section 3 study area is completely developed and paved over; (2) there are unlikely to be surface indications of extant archaeological cultural resources; and (3) all extant archaeological cultural resources are likely to be subsurface.

Airport Section 3 is an area of relatively low archaeological sensitivity based on historic background research and the results of past archaeological investigations in the vicinity. As discussed in the Historic Background section (Volume 1, Section 3), the intensity of land use within the vicinity of the project corridor was relatively low prior to historic agricultural enterprises and twentieth century development. As outlined in the Previous Archaeological Research section (Volume 1, Section 4), archaeological investigations within the vicinity of the project corridor have been somewhat sparse. However, based on these prior investigations, the likelihood of significant subsurface archaeological deposits or human burials is considered to be low. The background research presented in Volume I, Sections 3-5 provides the historic/cultural information necessary to make predictions regarding the types and potential locations of archaeological cultural resources within the study area. This background research, along with the detailed preliminary engineering information that delineates the actual project footprint, was used to develop the project's research design, including methods and sampling strategy.

The overall objective of the archaeological cultural resource identification activities described in the Airport Section 3 AISP was to (1) identify archaeological cultural resources that exist within the corridor, and to then (2) document each in sufficient detail to allow for (3) an assessment of their significance, in order to (4) determine the undertaking's potential effect on them and to (5) recommend appropriate mitigation measures to address any adverse effects.

Preparation of the research design for the Airport Section 3 AISP involved the following sequential steps:

1. Conducting environmental, cultural, historical, and archaeological background research;
2. Developing a predictive model of anticipated archaeological cultural resources based on the aforementioned research results of previous archaeological investigations;
3. Evaluating the efficacy of potential investigative methods and/or techniques (e.g., GPR);
4. Overlaying the undertaking's preliminary engineering plans on the predictive archaeological cultural resources model;
5. Developing a preliminary subsurface sampling strategy based on the overlay;
6. Consulting with the City, project engineers, SHPD, OIBC, community members, and other interested parties regarding the proposed AIS objectives, methods, and subsurface sampling strategy;
7. Modifying the sampling strategy, as needed, based on consultation comments;
8. Preparing a draft AISP for SHPD and community review and comment; and
9. Preparing a final AISP for SHPD approval that appropriately addresses the review comments.

Implementation of the Research Design and AISP involved the following:

1. Conducting a 100 percent surface survey of the Airport Section 3 corridor;
2. Implementing the field subsurface sampling strategy;
3. Modifying and/or augmenting the sampling strategy as needed to (a) adequately identify and document archaeological cultural resources that may be present within the Airport Section 3 corridor and to (b) make significance assessments and mitigation recommendations to address possible adverse effects; and
4. Collecting, processing, and analyzing specialized samples (e.g., bulk, pollen, charcoal) and artifacts found in excavated contexts, particularly from *in situ* cultural contexts.

AIS Report Preparation and Consultation involved the following:

1. Disseminating information to, and conducting consultations with, the City, SHPD, OIBC, NHOs, cultural descendants and other interested parties, to facilitate undertaking decisions, including burial treatment decisions in accordance with Programmatic Agreement, Stipulation III.B.4, significance assessments, project effect determination, and mitigation recommendations [note: no human remains were encountered in the Airport Section 3 corridor];
2. Coordinating with and incorporating results of supplemental studies (e.g., Traditional Cultural Places study, Historic Context and Landscape study) into the AIS report;
3. Preparing a draft AIS report for SHPD and community review;

4. Preparing a revised AIS report that appropriately addresses review comments; and
5. Disseminating the Final AIS report approved by SHPD to the City, SHPD, other appropriate government agencies, and NHOs in accordance with HAR §13-275(e)(3), including copies to libraries at the University of Hawai'i at Mānoa, Bishop Museum, University of Hawai'i at Hilo, Maui Community College, and Kaua'i Community College.

Research Focus

The environmental, cultural, historical, and archaeological background research (see above) conducted for the AISP indicates the potential for the AIS investigations to inform on a broad set of archaeological topics, including the following:

1. Settlement – The AIS investigations provide an opportunity to identify and document archaeological cultural resources within a narrow but continuous transect through O'ahu's densely developed coastal south shore. These investigations may inform on the spatial distribution of pre- and post-Contact habitation and other cultural activities within the corridor and their possible relationships with previously-identified archaeological cultural resources elsewhere within Hālawā and Moanalua Ahupua'a.
2. Pre-Contact Landforms and Shorelines – Although the coastal location of the Airport Section 3 corridor has been subjected to intensive modification during the post-Contact period, the AIS investigations may provide both discrete and broad data concerning pre- and post-Contact landform and shoreline changes. Potential exists to obtain data pertaining to pre- and/or early post-Contact shoreline fishponds, *lo'i* (irrigated pond fields), houselots, *kula* plots, as well as evidence of ranching, military and transportation infrastructure development, and the infilling of fishponds and mudflats, and other low-lying areas for residential and commercial development.
3. Human-Induced Environmental Change – In addition to the massive land reclamation activities that infilled fishponds and other nearshore areas (see #2 above), various specialized studies (e.g., pollen, wood taxa identification, radiocarbon dating, sediment analysis) hold potential to inform on human-induced changes to the biota of the area.
4. Human Burials – The AIS investigation provides an opportunity to yield information about the nature and spatial and temporal distribution of human burials in the area transected by the Airport Section 3 corridor. Also, (in concert with the ground penetrating radar (GPR) investigations, see #5 below) potential exists to identify them during the AIS, allowing for possible preservation through avoidance.
5. GPR Efficacy – The AIS provides an opportunity to further investigate the efficacy of GPR for identifying “signatures” that may be reliably correlated with specific cultural features, activities, or disturbances (e.g., human burials, buried utility trenches). Of particular interest is the efficacy of GPR investigations within an extensively developed urban landscape.

Ground Penetrating Radar Investigations

During the preparing of the AISP, CSH investigated the efficacy and cost benefit of a suite of different ground penetrating radar (GPR) antennae and techniques for the identification of human

burial remains and other types of subsurface archaeological features. A summary of the investigation and its results is provided below.

GPR Investigations

In 2010, at the request of CSH, TAG Research by Sturm, Inc. conducted a GPR investigation within select areas of Honolulu to test this remote sensing technology's efficacy in the identification and mapping of subsurface cultural deposits, including human burials (see Sturm 2010). This investigation sought to evaluate which antenna frequencies (270 MHz, 400 MHz, or 900 MHz), data collection parameters, and data processing procedures would be the most effective for potentially identifying and mapping subsurface cultural deposits within an urban setting dominated by extensive subsurface modifications including backfilled excavations, utility lines, and land filling.

GPR surveys were conducted at six locations: the Alapai Transit Center/Joint Traffic Management Center (ATC/JTMC), St. Augustine-by-the-Sea Church, a portion of Halekauwila Street, the proposed location of the Civic Center Station, and two discrete areas at the Kaka'ako Fire Station (Figure 9). The GPR survey areas within the proposed location of the Civic Center Station and Halekauwila Street are both situated within the project corridor. CSH previously investigated the other four survey areas using subsurface testing and/or archaeological monitoring (Pammer et al. 2009; Pfeffer et al. 1993; Yucha et al. 2011). During these prior archaeological investigations, subsurface cultural deposits, including human burials, were identified within stratigraphic contexts that are similar to ones anticipated within the project corridor. Thus, the four survey areas located outside the project corridor provide an opportunity to examine how GPR records subsurface cultural deposits (e.g., human burials) and models to GPR data collected within the project corridor. The results would address the efficacy of using GPR to identify the presence of subsurface cultural deposits prior to subsurface testing.

The results of the GPR methods investigation were promising, although with some restrictions and limitations. TAG Research was able to confirm the locations of known human burials within all of the survey areas in which burials were previously recorded. Burial pits were represented in GPR depth profiles as ephemeral hyperbolic reflections. These hyperbolic reflections were associated with stratigraphic irregularities caused by burial pit excavation (i.e., burial shafts and associated backfill material) rather than by the burials themselves (Sturm 2010). This likely reflects numerous factors, including the sediment mineralogy and deterioration of the burial and/or casket, if one was present. The hyperbolic reflections corresponding to the known locations of previously recorded burials were the only GPR anomalies that could be confidently determined to be associated with human burials.

Other subsurface features that were able to be identified and mapped via GPR were fill deposits and utility lines. In general, both of these features were represented in GPR imagery (i.e., depth profiles and amplitude slice maps) as high amplitude reflections of large size. Anomalies associated with utility lines were linear and tended to be narrower than the large amorphous masses associated with fill deposits.

These results led to the determination that "the overall potential for using the GPR method to map archaeological features and burials in this urban Honolulu setting is considered very good up to about 1.5 m in depth" (Sturm 2010:35). Of note, however, were several limitations, including the inadequate resolution of GPR readings below 1.5 m and the fact that the

association of subsurface anomalies with possible burials could only be accomplished with confidence in areas where burials had already been confirmed to be present (i.e., through previous archaeological subsurface testing or historic land use research).

Another goal of the GPR investigations was to address the question of depth penetration and resolution in relation to various GPR antenna frequencies (270 MHz, 400 MHz, and 900 MHz). Based on the results of the GPR surveys, the 400 MHz antenna was determined to provide the best overall quality data, allowing high resolution mapping of target features of interest (including burials) to a depth of up to 1.5 m. While the 270 MHz antenna achieved the overall greatest depth at each location surveyed, it was unable to provide adequate resolution to target features of interest, including burials. Conversely, the 900 MHz antenna provided the best resolution of subsurface features but was limited to an average depth penetration of 0.5 m, which in a majority of Honolulu is a stratigraphic zone dominated by imported fill deposits.

Recommended data collection parameters for conducting future GPR surveys within the project corridor include conducting surveys within wider areas or blocks, as opposed to single narrow transects, using a transect spacing of 50 cm or less, and having a high number of scans per meter (e.g., 40 scans). Together, these parameters will ensure the collection of high-resolution data and subsequent maps of potential archaeological features of interest, which are typically small or subtle and could be easily missed by using wide transect spacing or coarser resolution collection (Sturm 2010:36).

Recommended GPR data post-processing involves the creation of GPR reflection profiles and amplitude slice maps for the analysis of collected data. Reflection profiles illustrate the shape, geometry, and depth of the radar reflections recorded during data collection. An analysis of these profiles can determine whether radar energy is reflecting from a flat stratigraphic layer (seen as a distinct horizontal band), a discrete buried object (seen as a hyperbola), or from stratigraphic irregularities such as subsurface disturbances associated with utility installation or human interment (also seen as hyperbolas, but usually are more ephemeral and consist of clustered reflections).

Amplitude slice maps are a three-dimensional tool for viewing differences in radar reflection amplitudes across a given surface at various depths. Amplitude slice maps can be thought of as plan view maps or excavation level records that display GPR data at user-defined depth intervals. Reflected radar amplitudes are of interest because they measure the degree of physical and chemical differences in buried materials, which in turn can indicate the presence of stratigraphic interfaces, discrete buried objects (e.g., basalt boulders, utility lines, burial caskets, etc.), or stratigraphic irregularities (i.e., subsurface anomalies associated with burial pits, fire pits, buried irrigation ditches, etc.). Amplitude slice maps are important because they allow the visualization of radar reflections throughout the entire dataset collected at a survey area at a given depth. This gives size and shape to collected radar reflections, which can aid in the interpretation of identified subsurface anomalies.

Finally, while this GPR investigation was successful at mapping many features of interest, including several previously-recorded burials, many of the feature interpretations were based on knowledge gained from previous archaeological investigations that involved extensive background research and subsurface testing. It is thus recommended that future GPR surveys be

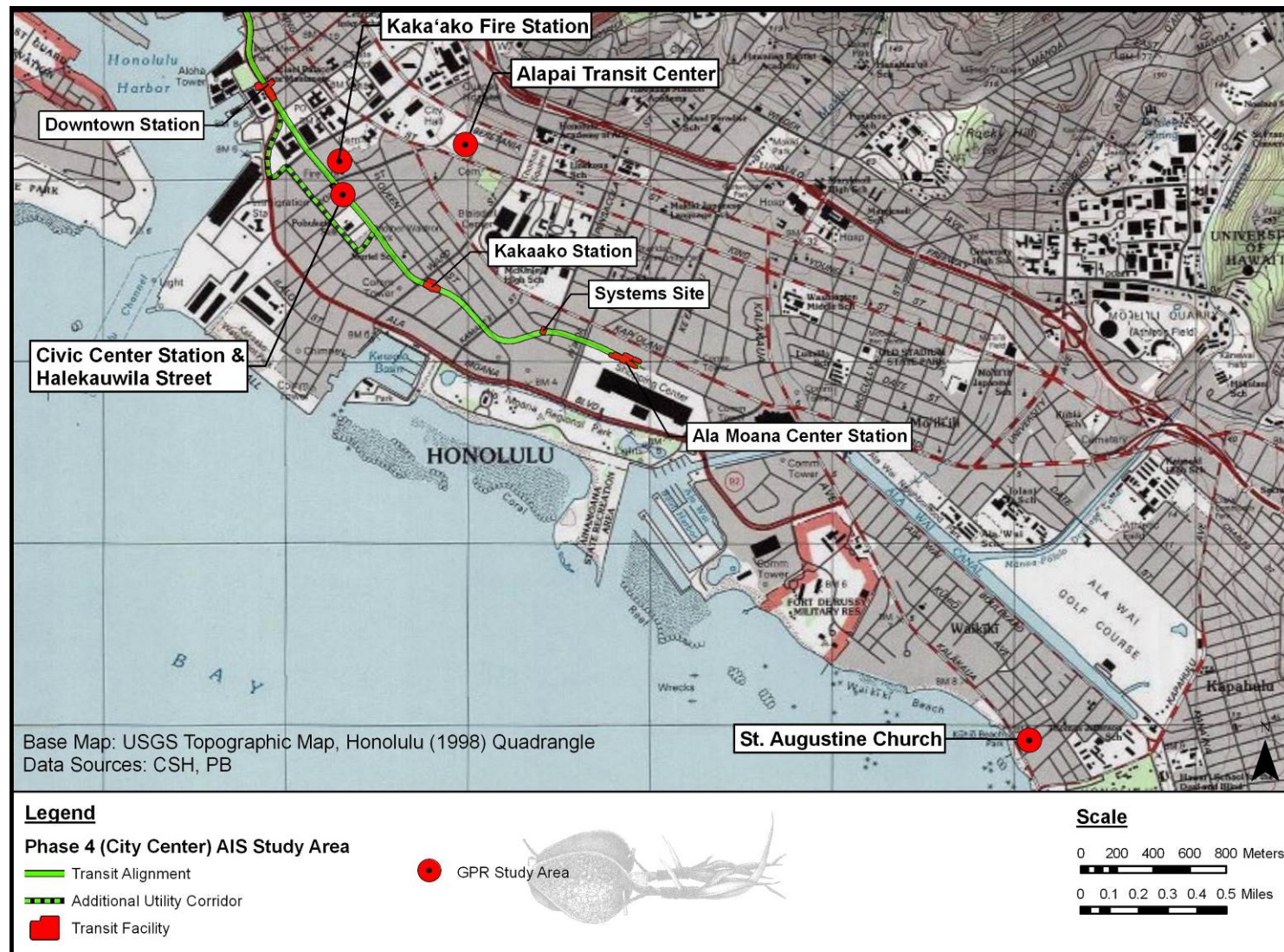


Figure 9. Overlay of City Center Section 4 study area and four survey areas used for testing the efficacy of GPR methods during preparation of the AISP (1998 U.S. Geological Survey 7.5-Minute Series Topographic Map, Honolulu Quadrangle)

correlated with site-specific historic research and subsurface testing (i.e., excavation) wherever possible (Sturm 2010:29, 36). A detailed report of the findings of the GPR investigations can be found in Appendix D of the AISP for Airport (Hammatt and Shideler 2011).

Consultation

As part of the preparation of the Airport Section 3 AISP, CSH contacted a wide range of state agencies, Native Hawaiian Organizations, lineal and cultural descendants, and other interested individuals and groups in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the study area and the surrounding vicinity (refer to Appendix D of this volume). Organizations consulted include the SHPD, the Office of Hawaiian Affairs (OHA), and the O'ahu Island Burial Council (OIBC). In accordance with Stipulation III of the HHCTCP Programmatic Agreement, CSH pursued consultation in order to gain input and comment on the scope and design of the Airport Section 3 AISP, and in order to create a draft protocol for consultation regarding the treatment of any *iwi kūpuna* identified during the AIS.

During the Airport Section 3 AIS fieldwork, and subsequently during the preparation of this AIS report, CSH consulted frequently with the OIBC and SHPD throughout late 2012 and early 2013 regarding the progress and results of the AIS investigation. This consultation included status summaries of the AIS Airport Section 3 fieldwork and AIS report preparation at each OIBC monthly meeting and at least twice monthly meetings with SHPD. On February 20, 2013, CSH met with OHA and updated their archaeological and cultural staff on the Airport Section 3 AIS results. Additionally, CSH presented updates of the Airport Section 3 AIS investigation at several public meetings (November 8 and 27, and December 17, 2012, and February 7, 2013) arranged to consult with potential cultural descendants to the HHCTCP project.

Field Methods

In general, fieldwork included 100 percent pedestrian inspection of the study area; global positioning system (GPS) data collection; GPR survey; and subsurface testing. All areas selected for subsurface testing were surveyed with a Geophysical Survey Systems, Inc. SIR-3000 GPR unit equipped with a 400 MHz antenna. The planned subsurface testing program was backhoe-assisted. In general, linear test excavations measuring approximately 3 m or 6 m (10 ft or 20 ft) long and 0.6 or 0.9 m (2 ft or 3 ft) wide were excavated within the project footprint (based on preliminary engineering) at selected station locations, guideway column locations and utility relocation areas. Forty test excavations were proposed, with the potential for additional testing to refine the boundaries of subsurface deposits. A total of 47 test excavations were completed.

Personnel and Scheduling

Airport Section 3 AIS fieldwork proceeded under the direction of CSH principal investigator Matt McDermott, M.A. A field crew of eight to ten archaeologists, including one field director, two GPS/GIS specialists, and two GPR specialists, completed the AIS investigation under the direction of the principal investigator.

Pedestrian Survey

Pedestrian inspection of the study area was completed at 100 percent coverage. The pedestrian inspection was accomplished through systematic sweeps. As the study area is generally located in the median or shoulder of existing roadways, archaeologists traversed the medians and

shoulders of the active thoroughfare. The pedestrian inspection focused on identification and documentation of surface archaeological cultural resources; none were found. Identification and documentation of the project area's architectural cultural resources, including historic roads, bridges, and structures, was conducted by historic architectural firm Mason Architects, Inc., in association with the project's Final Environmental Impact Statement (FEIS) (USDOT/FTA and C&C/DTS 2010). No surface archaeological cultural resources were found.

GPR Survey

GPR use is specifically dictated in the HHCTCP Programmatic Agreement. The GPR focus evaluated the GPR effectiveness and strove to make observations that could potentially improve GPR effectiveness through "ground truthing" (comparison of GPR results with actual excavation results).

All areas selected for subsurface testing were surveyed with GPR prior to excavation. GPR field data were post-processed and used to inform the subsurface testing results. The GPR survey was performed using a Geophysical Survey Systems, Inc. (GSSI) SIR-3000 system equipped with a 400 MHz antenna. This is a bistatic system in which electromagnetic energy in the radar frequency range is transmitted into the ground via a sending antenna. Radar energy is reflected off the subsurface matrix and is then received by a paired antenna. Reflected energy is sampled, and the travel time (in nanoseconds) of the reflected waves is recorded. Wave propagation speed varies depending on the nature of the subsurface medium. Any changes in density or electromagnetic properties within the stratigraphic column may cause observable variations in reflection intensity. Reflection features may include discrete objects, stratigraphic layering, or other subsurface anomalies.

GPR surveys were conducted in blocks centered on the subsurface testing area. The GPR survey results generated two-dimensional (2D) depth profiles to prospect for subsurface anomalies and stratigraphic interfaces prior to excavation, as these could correspond to isolated archaeological features or sediments that are more likely to contain cultural deposits. Following the completion of subsurface testing, the documented stratigraphy was referenced against the GPR profiles to establish if there were patterns in the GPR data that may be associated with stratigraphic interfaces, sediment types, and subsurface features (e.g., trash pits, construction debris).

The GPR surveys were also conducted to assess the ability of GPR in determining stratigraphy and locating cultural deposits in the study area (i.e., urban Honolulu). The effectiveness of GPR is highly dependent on local soil conditions. The high signal attenuation rate of many soil types restricts the depth of radar penetration and therefore limits the effectiveness of GPR surveys. The National Resource Conservation Service (NRCS) produced maps indicating the relative suitability of GPR applications throughout the country based on U.S. Department of Agriculture (USDA) soil survey data. Figure 10 shows the study area on the NRCS GPR Suitability Map for Hawai'i. The study area is shown to traverse lands in the moderate ("# 3") and very low ("# 5") suitability categories.

Excavation Methods

The subsurface testing program was backhoe-assisted. In general, linear test excavations measuring approximately 3 m or 6 m (10 feet or 20 feet) in length and 0.6 or 0.9 m (2 feet or 3 feet) in width were excavated within the project footprint (based on preliminary engineering) at

selected station locations, guideway column locations, and utility relocation areas. To the extent feasible, test excavations were excavated at the precise location of the proposed guideway column foundations/utility relocation areas, as currently shown on the undertaking's preliminary engineering plans; however, it was clear that considerable conflicts existed between the proposed AIS testing locations and existing subsurface utilities. In cases where subsurface testing at the precise location of a proposed guideway column foundation/utility relocation area was prohibitively problematic due to existing subsurface utilities or other constraints, the test excavation was slightly offset from the column foundation location, or an alternative test area was selected. Excavations were made to depths of culturally sterile sediments, bedrock, or just below the water table (excepting where safety concerns came into play).

The testing program also focused on characterizing the remnants of the Airport Section 3 study area's buried natural land surface that predates the historic and modern fill layers. These remnants of the former land surface are more likely to be associated with significant cultural deposits.

CSH personnel closely monitored all backhoe excavation activity. Archaeologists watched as the backhoe excavated at a normal pace, as well as inspected the sediment as it was removed from the ground and dumped into a backfill pile adjacent to the test excavation. A standard backhoe with a 2-foot-wide bucket was used to excavate, at a minimum, portions of each test excavation. Working within safety constraints, and based on the type of sediments exposed, the archaeological crew members stopped mechanized excavation and entered the test excavation to clean off the test excavation sidewalls and base to inspect for cultural deposits.

Sampling

Sampling of subsurface cultural layers and/or A-horizons was carried out to characterize the cultural content of these layers. Sampling also helped to establish the spatial extent of the layers and the general time frame of their deposition (prehistoric/traditional Hawaiian and/or historic and/or modern). Sampling was undertaken for both pit features and portions of stratigraphic layers that were not part of a particular cultural feature. The distinction between samples from pit features and samples from stratigraphic layers potentially reflected differences in cultural material content between sediment from specific events, such as the excavation and use of a pit, and the more general accumulation of sediment as part of a culturally-enriched living surface or A-horizon.

The samples from pit features and from layer deposits were excavated out of the sidewall or from the base of the excavation into 5 gallon buckets. The sediment then was screened through 1/8-inch wire mesh and all cultural materials were collected, bagged by provenience, and taken to the CSH laboratory. During the collection of cultural materials from the screen, careful attention was made to distinguish between water-rounded, bleached, natural marine, sedimentary shell, and the unbleached, non-rounded, often relatively freshly-broken shell derived from human activity. The volume of each screened sample was recorded so that comparisons could be made between samples.

Where appropriate, column sediment samples of discrete stratum, or series of strata, were taken directly from the cleaned sidewall of the test excavation. Depending on the type of sediment to be sampled and the analytic purpose, column samples were collected in 5, 10,

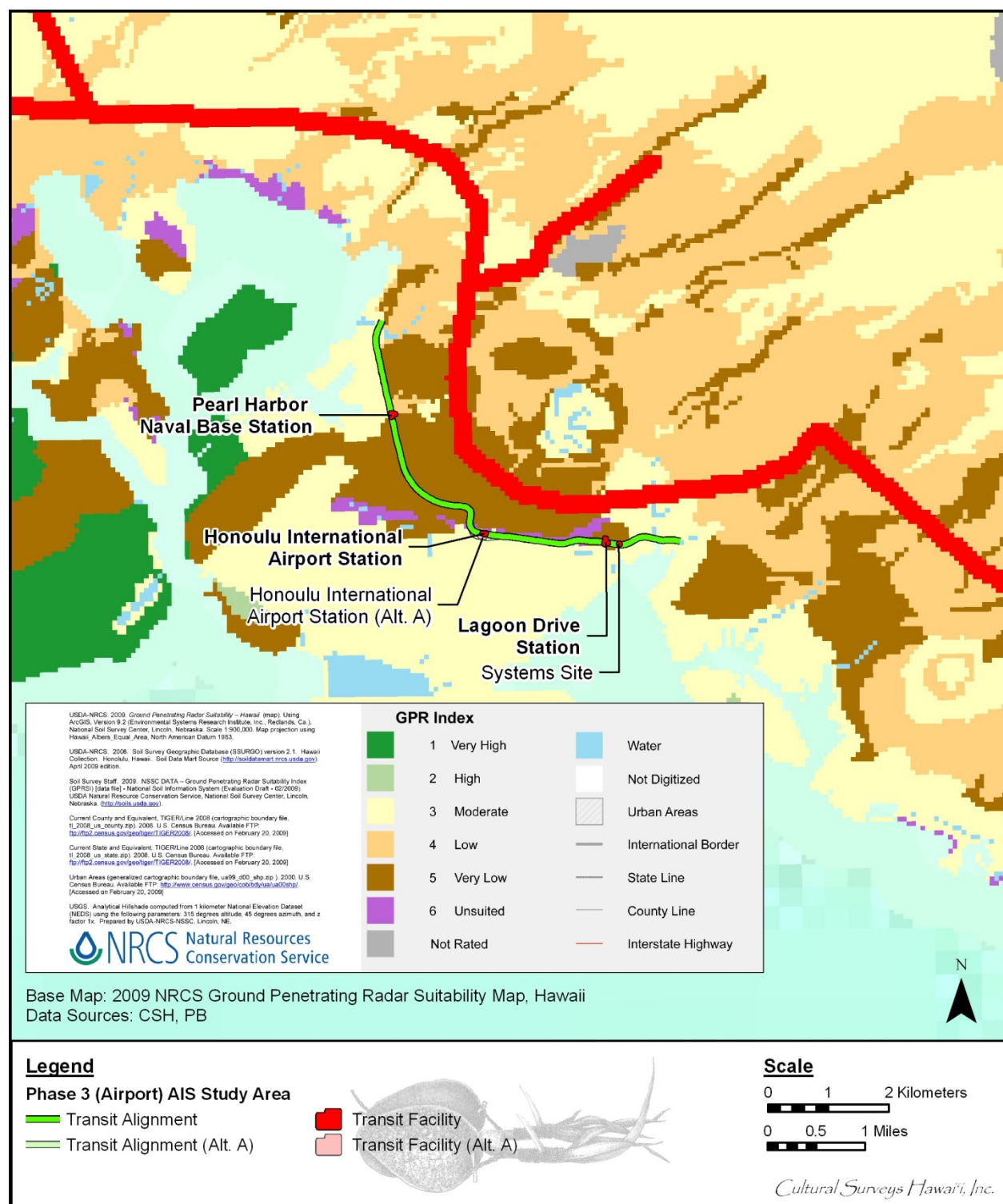


Figure 10. NRCS (2009) GPR Suitability Map for Hawai'i showing the Airport Section 3 study area

or 20 cm depth intervals. For example, column samples from low energy alluvial sediments that could inform on environmental conditions and environmental change were collected at 5 cm intervals. These samples were collected for possible radiocarbon dating, pollen analysis, and/or micro charcoal particle quantification.

Where additional documentation of particular sediments was desired, bulk sediment samples of 1 to 5 liters were collected from the cleaned sidewall of the test excavation for further analysis in the laboratory. These samples were used to better characterize the sediments and for further analysis, including wet screening through 1/16-inch mesh to better inspect the sample contents. All sediment sample collection locations were recorded on test excavation profiles and/or plan views (unless collected from the backhoe), and the sediment samples were labeled with provenience information.

Background research indicated the possibility of encountering historic trash pits, privies, and other historic pit features in the AIS test excavations. These types of historic features typically contain substantial numbers of individual artifacts, including possible building materials, metal fragments, household refuse, and/or industrial refuse. Artifact material types include brick, stone, wood, glass, metal, ceramic, bone, and plastic. Documentation of these historic, generally artifact-rich, features focused on recording their dimensions and locations so that their distribution could be considered in relation to historic land use of the study area. The AISP specified that recordation of these features would focus on collecting sufficient information to characterize the feature's age, and possibly the feature's duration of use, and to characterize the feature's function (e.g., residential versus commercial or industrial refuse disposal). Also that much of the artifact documentation, for example with redundant bottle types, faunal remains, etc., would be done in the field with photographs, written descriptions, and detailed quantification. The collection of historic artifacts was often limited to diagnostic and/or interpretive items, or items that could not be readily identified in the field that required further analysis in the laboratory. Large numbers of redundant diagnostic historic artifacts from the same features were documented with photographs and written descriptions and systematically quantified in the field, but were not collected. Non-diagnostic glass, metal, wood, stone, plastic, and ceramic fragments were quantified and photographed but were not collected. Of course, appropriate collections of new classes of artifacts or other archaeological materials not readily identified in the field were collected in the field for laboratory analysis. This historic feature sampling strategy focused on recovering useful archaeological information without unnecessarily increasing the collection volume of redundant artifacts and faunal remains from the study area.

Photography

Photographs were taken of the general project area and in-progress work, recording on-the-job procedures, personnel, work conditions, and the area's natural and/or built environment. Additionally, all subsurface features, cultural layers, profiles, and artifacts were photographed. A photographic scale and north arrow, as appropriate, were included in each photograph.

Excavation Sampling Strategy

The original AISP sampling strategy consisted of 40 test excavations within the 9.06-acre Airport Section 3 corridor footprint (Figure 11 through Figure 40, which show the original AISP excavation locations). In general, the archaeological subsurface test excavations were distributed

throughout the study area to provide representative coverage and assess the stratigraphy and potential for subsurface cultural resources for the entire Airport Section 3 study area. The sampling strategy as outlined in the Airport AISP (Hammatt and Shideler 2011) was developed in consideration of the following:

- Sediment types;
- Natural geographic features;
- Background research, including information from historic maps and Land Commission Awards (LCA) documents;
- Results of previous archaeological studies in the vicinity;
- Results of consultation with the Native Hawaiian community;
- Assessment of the impact of prior land development; and
- Consideration of safety concerns for actually carrying out the archaeological work.

During the Airport Section 3 AIS fieldwork, HART indicated there may be a need to shift the location of the Airport Transit Station approximately 60 m south (*makai*) of the Honolulu International Airport station location addressed in the AISP (Hammatt and Shideler 2011). This potential slight shift in the transit corridor, to provide access to the shifted station location, and the new station location itself, increased the project APE for archaeological cultural resources (defined as the area of direct project ground disturbance in the project PA). Accordingly, this possible Alternate A Station site was addressed in an Addendum AISP (Hammatt and Shideler 2013) approved by SHPD in a letter dated March 1, 2013 (Log No. 2013.1957, Doc. No. 1302SL29).

As a result of consultation with SHPD, it was agreed that an additional seven test excavations would be added at the location of Alternative A for the Airport Transit Station. Two of the additional excavations were in the footprint of the guideway columns and five were in the footprint of the shifted station. These additions increased the total Airport Section 3 AIS testing locations from 40 to 47.

Of the total 47 Airport Section 3 test excavations, the majority were located within the footprint of proposed column foundations. A total of 26 column foundation test excavations were tested across the project area. Additionally, one test excavation was located in the area of a utility relocation within the vicinity of the Pearl Harbor Naval Base Station (Figure 16).

Subsurface testing also focused on the three transit station locations within Airport Section 3 due to the relatively high density of subsurface impacts related to their construction and because relocation of the stations would be problematic owing to geographical and engineering constraints (see Figure 17, Figure 28, and Figure 35). A total of 20 proposed test excavations were completed within the footprints of the three transit stations: Pearl Harbor Naval Base Station (five excavations); Honolulu International Airport Station (ten excavations—five each for the two proposed station locations); and Lagoon Drive Station (five excavations). Table 5 compares the original AISP testing locations from the Airport Section 3 AISP to the actual testing locations, and also lists the seven additional testing locations for Airport Alternative A, described in this AIS report. Table 5 includes figure references for AISP-described original test

excavation locations (Figure 11 through Figure 40 in this Appendix C) and figure references for the actual excavation locations shown in figures in excavation summary Section 7.2 of AIS Volume 1. Table 6 lists all test excavation locations and settings.

The need for any additional testing that might have been warranted was worked out in consultation with SHPD.

The greatest factors limiting the survey effort were:

- The survey area's large (9.06 acres), dispersed (4.8 miles) area;
- The survey area's highly developed and highly active setting (in-use city streets, sidewalks, and buildings); and
- The dense, complex array of existing subsurface utilities in the survey area.

Table 5. Comparison of Test Excavation Locations Proposed in AISP (Hammatt and Shideler 2011) to Actual Test Excavation Locations

Test Excavation #	Comment
T-001	Excavated at Kalaoa Street/Kamehameha Highway as indicated, adjusted for slight shift in column location (see Figure 11)
T-002	Excavated just north of Hālawā Stream as indicated, slightly shifted but testing the same proposed column (see Figure 11)
T-003	Excavated just south of Hālawā Drive/Arizona Road as indicated but offset slightly (< 3 m) to the south and re-oriented east/west (see Figure 12)
T-004	Excavated just south of Hālawā Drive/Arizona Road as indicated (see Figure 12)
T-005	Relocated just slightly from the east side of Kamehameha Highway to center of highway as column location was re-designed (see Figure 15)
T-006	Excavated at northeast corner of Kamehameha Highway and Radford Drive as indicated but shifted approx. 20 m to the NW (see Figure 16)
T-007	Repositioned slightly within refined Pearl Harbor Naval Base Staiaon footprint (see Figures 16 and 17)
T-008	Excavated within Pearl Harbor Naval Base footprint (see Figures 16 and 17)
T-009	Repositioned slightly within refined Pearl Harbor Naval Base Staiaon footprint (see Figures 16 and 17)

Test Excavation #	Comment
T-010	Repositioned slightly within refined Pearl Harbor Naval Base Station footprint (see Figures 16 and 17)
T-011	Repositioned slightly within refined Pearl Harbor Naval Base Station footprint (see Figures 16 and 17)
T-012	Same location on Kamehameha Highway just north of Center Drive, adjusted for slight shift in column location (see Figure 18)
T-013	Same location along Makai Frontage Road, with slight shift (see Figure 19)
T-014	Same location along Makai Frontage Road, adjusted for slight shift in column location and rotated 90° (see Figure 20)
T-015	Same location southwest of the H-1 Freeway, adjusted for slight shift in column location (see Figure 21)
T-016	Same location southwest of the H-1 Freeway, adjusted for slight shift in column location (see Figure 21)
T-017	Same location south of the H-1 Freeway and just east of Valkenburgh Street, adjusted for slight shift in column location (see Figure 22)
T-018	Off-set 40 m to next column foundation to the east on the south (<i>makai</i>) side of the H-1 Freeway, east of Main Street and west of Elliott Street (see Figure 23)
T-019	Same location south of the H-1 Freeway (see Figure 24)
T-020	Off-set 40 m to the south (<i>makai</i>) on Aolele Street (see Figure 25)
T-021	Off-set 70 m to the south side of Rodgers Blvd. (see Figure 26)
T-022	Repositioned slightly within refined Honolulu International Airport Station footprint (see Figures 27 and 28)
T-023	Repositioned slightly within refined Honolulu International Airport Station footprint (see Figures 27 and 28)
T-024	Repositioned slightly within refined Honolulu International Airport Station footprint (see Figures 27 and 28)
T-025	Repositioned slightly within refined Honolulu International Airport Station footprint (see Figures 27 and 28)
T-026	Repositioned slightly within refined Honolulu International Airport Station footprint (see Figures 27 and 28)
T-027	Same location on Ala Onaona Street, adjusted for slight shift in column location (see Figure 29)
T-028	Additional trench just east of Aolele Street/Aolewa Place (see Figure 30)

Test Excavation #	Comment
T-029	Off-set 40 m east on Aolele Street towards Aolewa Place (see Figure 30)
T-030	Off-set 50 m to the northeast along Aolele Street (see Figure 32)
T-031	Same location on Ualena Street, but rotated 90° (see Figure 33)
T-032	Off-set 25 m north within Makai Station Entrance Building due to station design refinement (see Figures 34 and 35)
T-033	Repositioned slightly within Mauka Station Entrance Building (see Figures 34 and 35)
T-034	Repositioned slightly within Makai Station Entrance Building (see Figures 34 and 35)
T-035	Moved 7 m south to test proposed utility line (see Figures 34 and 35)
T-036	Same location within Lagoon Drive Station (see Figures 34 and 35)
T-037	Same location southeast of Waiwai Loop (see Figure 36)
T-038	Same location at Ke'ehi Lagoon Park, adjusted for slight shift in column location (see Figure 36)
T-039	Same location at Ke'ehi Lagoon Park, adjusted for slight shift in column location (see Figure 37)
T-040	Off-set 70 m west at the Nimitz/Kamehameha Highway/Middle Street interchange (see Figure 39)
T-041	Additional test excavation added on the south side of Rodgers Blvd. (see Figure 26)
T-042	Additional test excavation <i>makai</i> of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (see Figures 27 and 28)
T-043	Additional test excavation <i>makai</i> of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (see Figures 27 and 28)
T-044	Additional test excavation <i>makai</i> of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (see Figures 27 and 28)
T-045	Additional test excavation <i>makai</i> of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (see Figures 27 and 28)
T-046	Additional test excavation <i>makai</i> of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (see Figures 27 and 28)

Test Excavation #	Comment
T-047	Additional test excavation <i>makai</i> of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (see Figures 27 and 28)

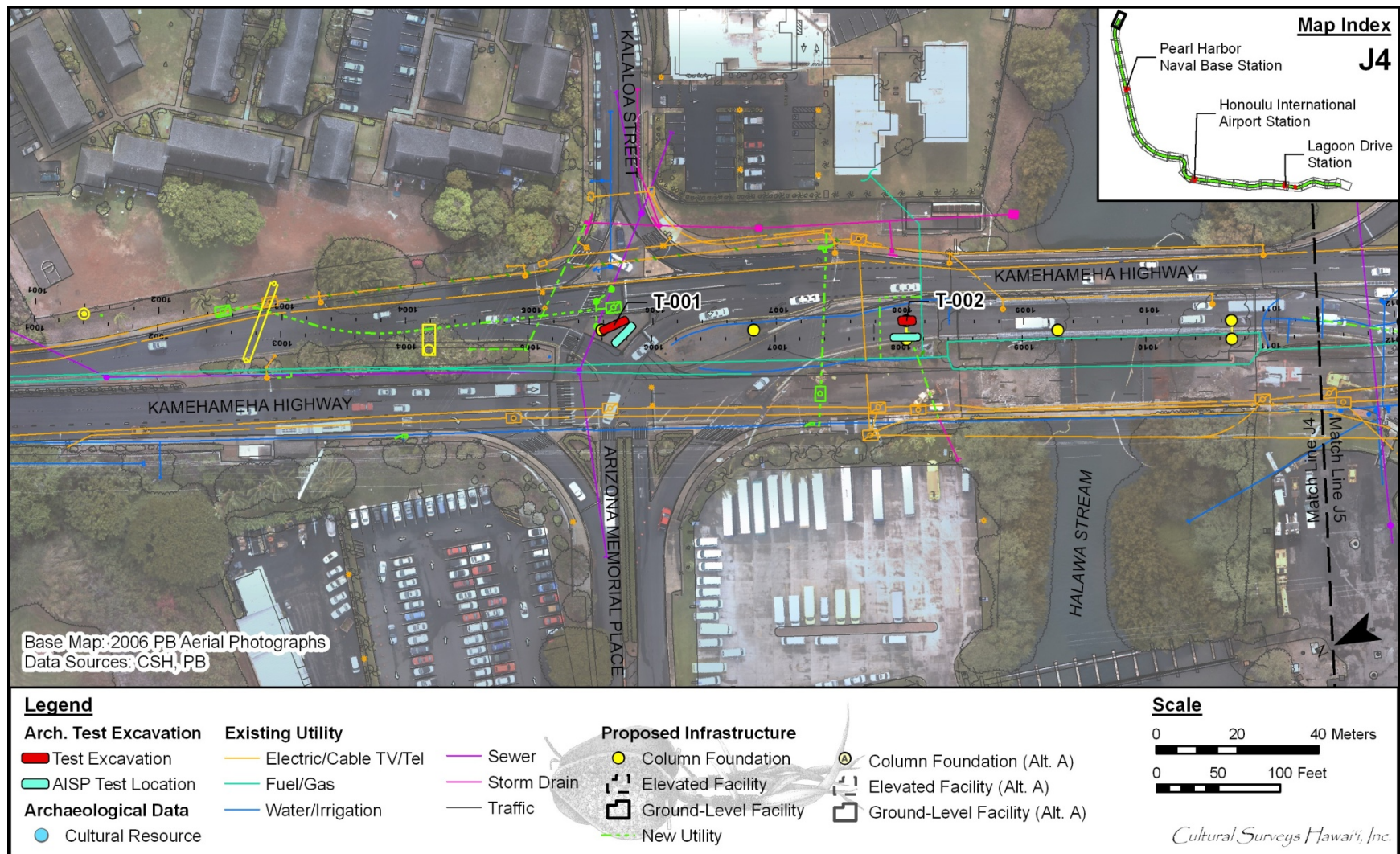


Figure 11. Map Sheet J4 (near Kalaloa Street), two test excavations (T-001, T-002) at column foundations @ 994+40 & 996+70

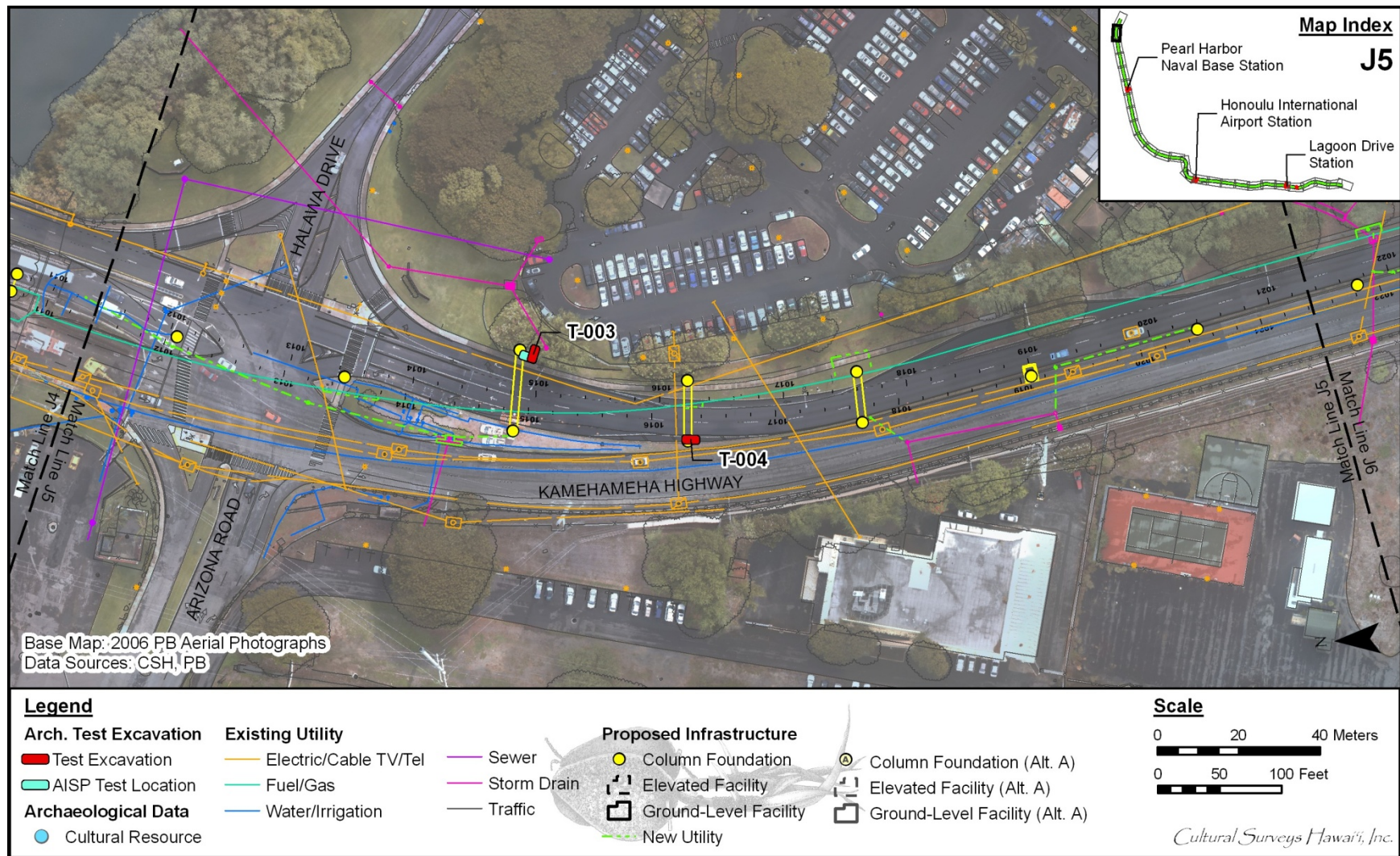


Figure 12. Map Sheet J5, two test excavations (T-003, T-004) at column foundations @ 1003+60 & 1004+90

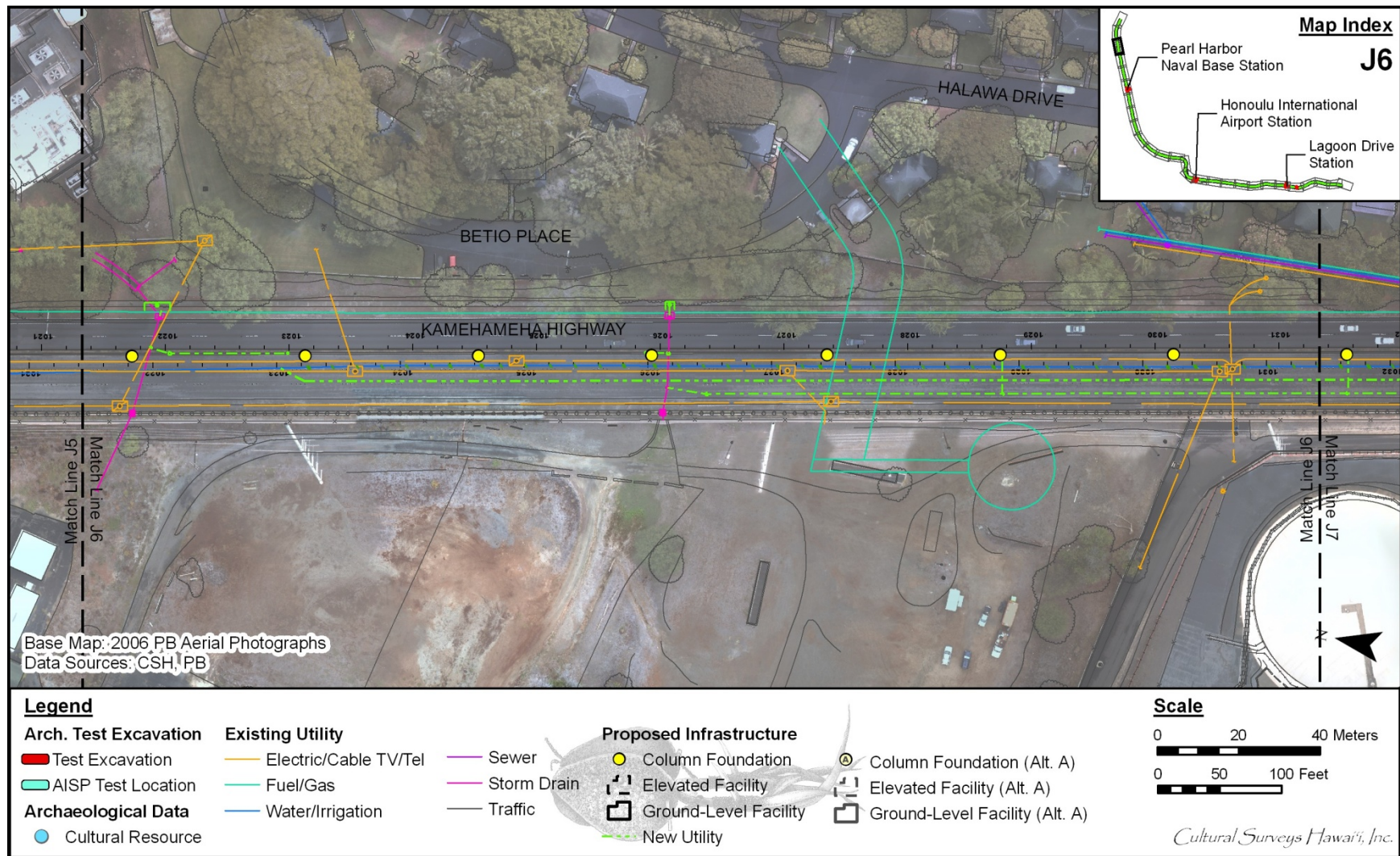


Figure 13. Map Sheet J6, no test excavations due to traffic constraints

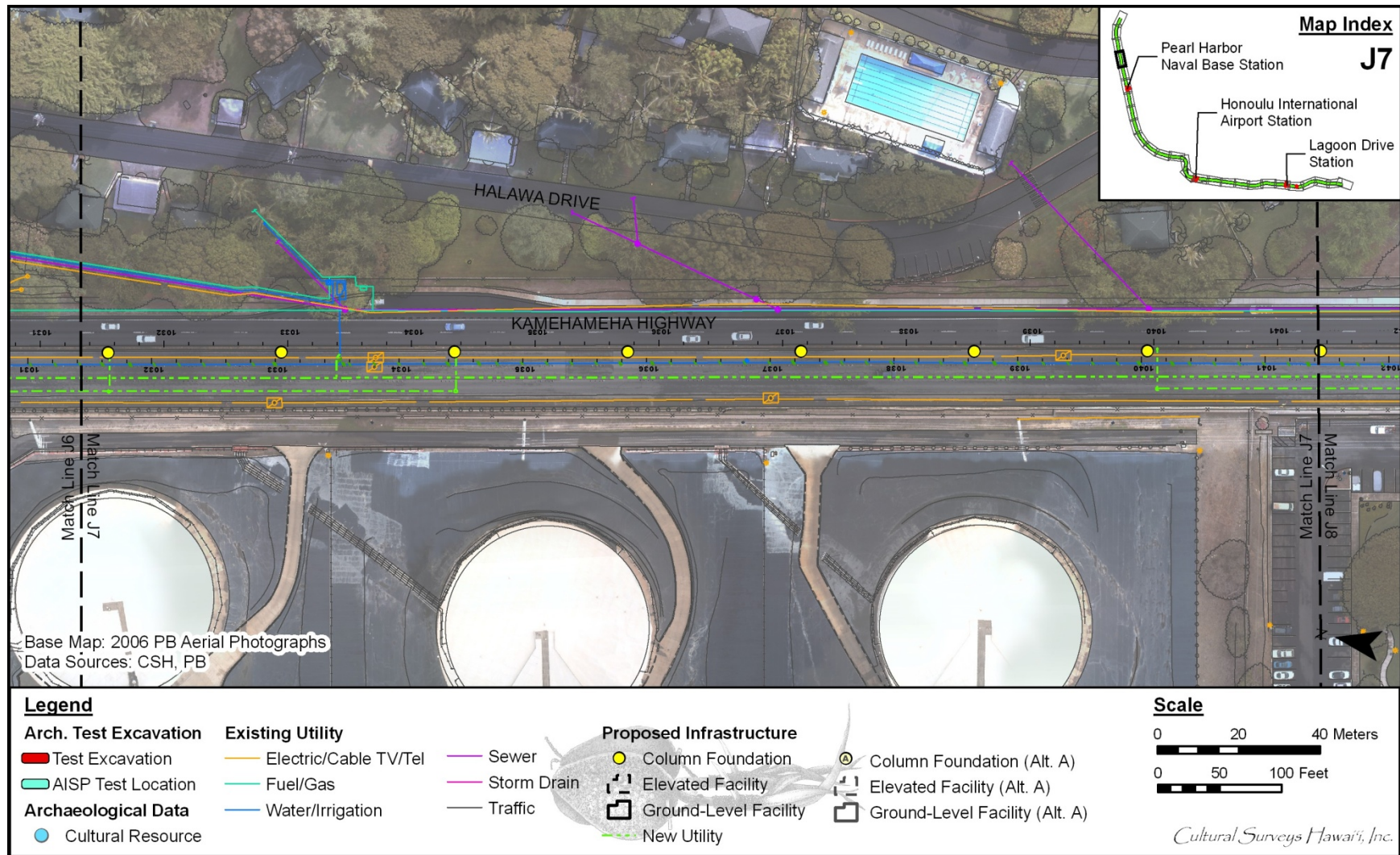


Figure 14. Map Sheet J7, no test excavations due to traffic constraints

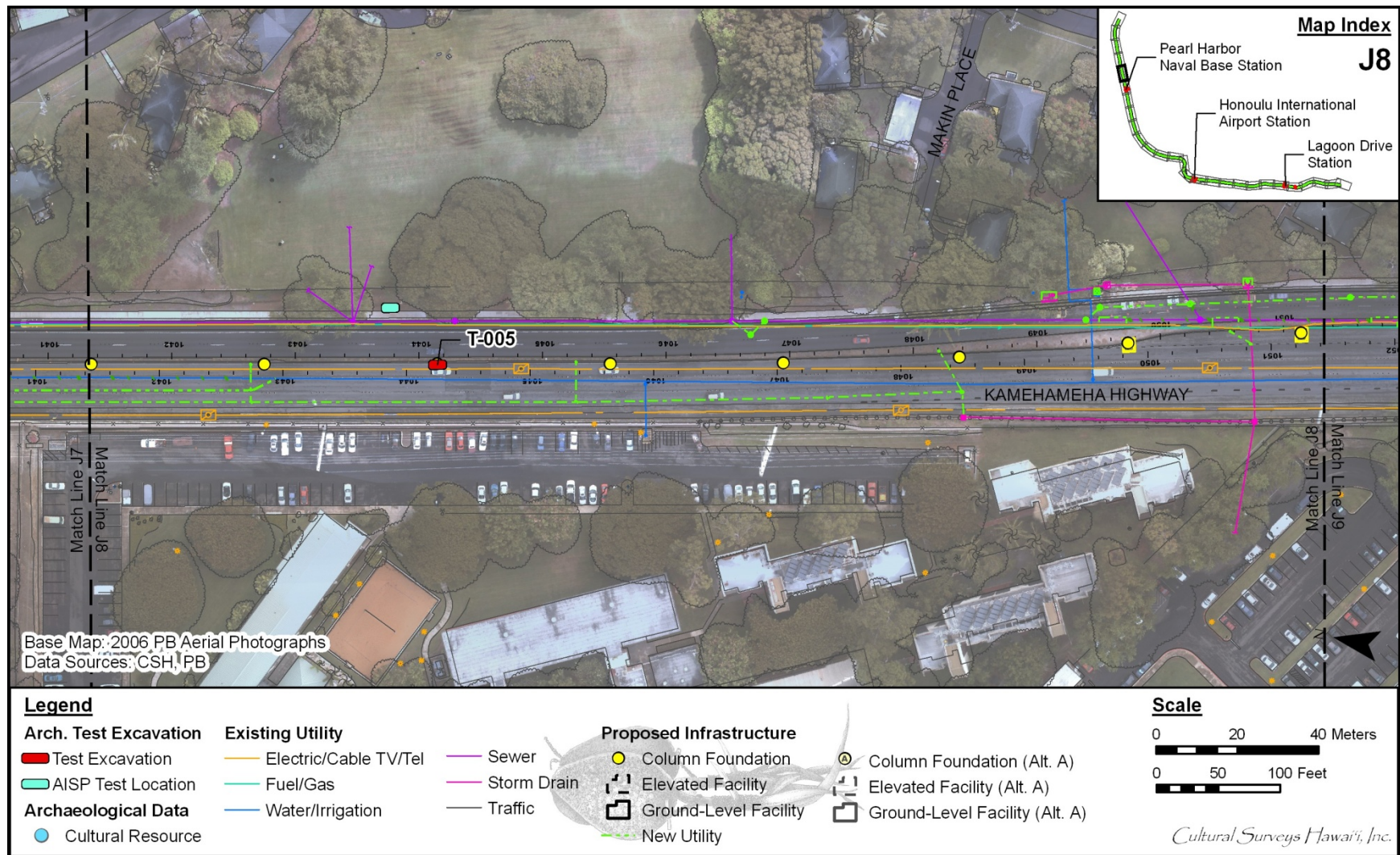


Figure 15. Map Sheet J8, one test excavation (T-005) near column foundation @ 1032+40

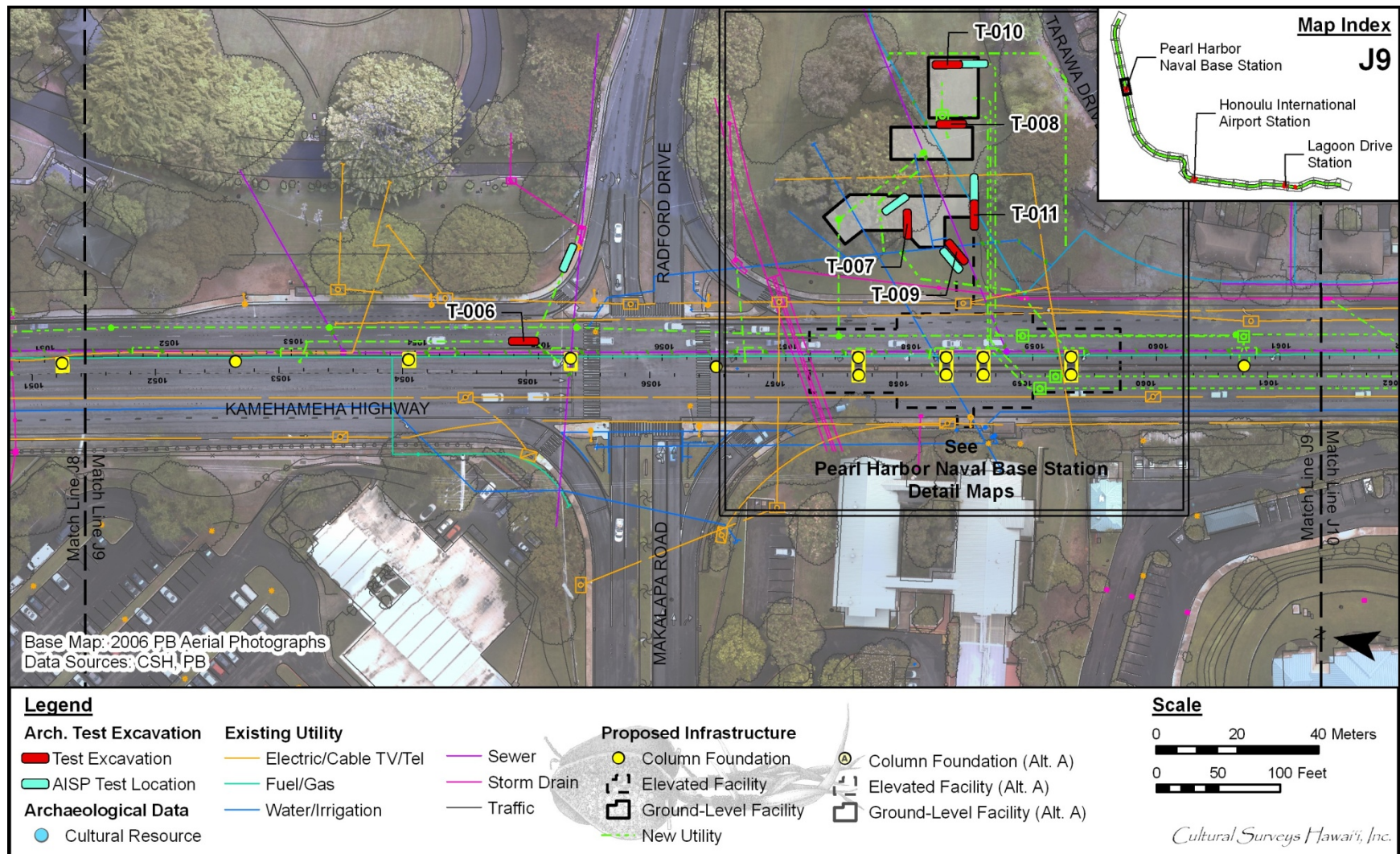


Figure 16. Map Sheet J9 (near Radford Drive), one test excavation (T-006) at utility relocation (24" storm drain) @ 1043+90 (see Station testing layout on following figure)

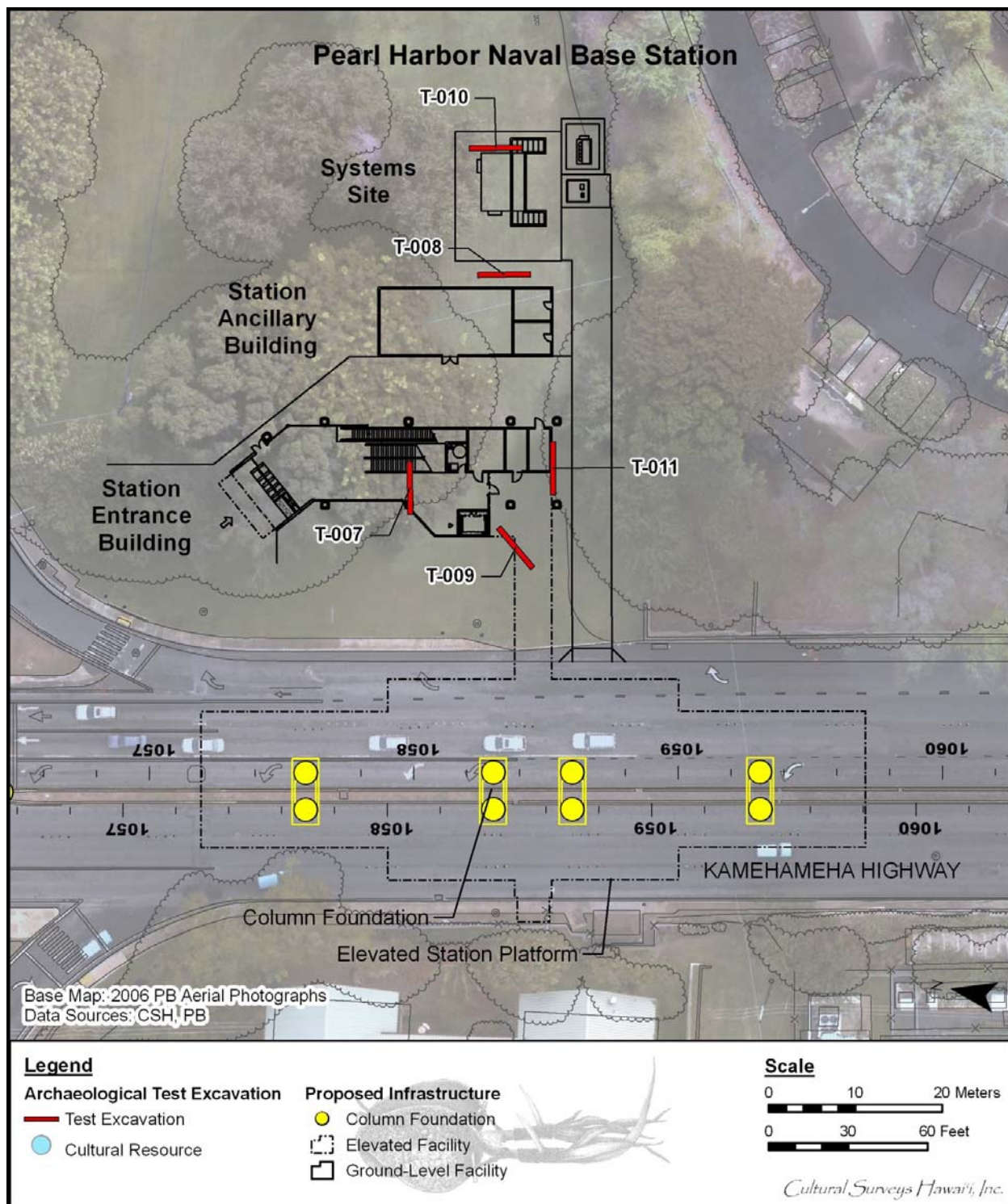


Figure 17. Map Sheet J9, Pearl Harbor Naval Base Station, east of Radford Drive, five test excavations (T-007 through T-011)

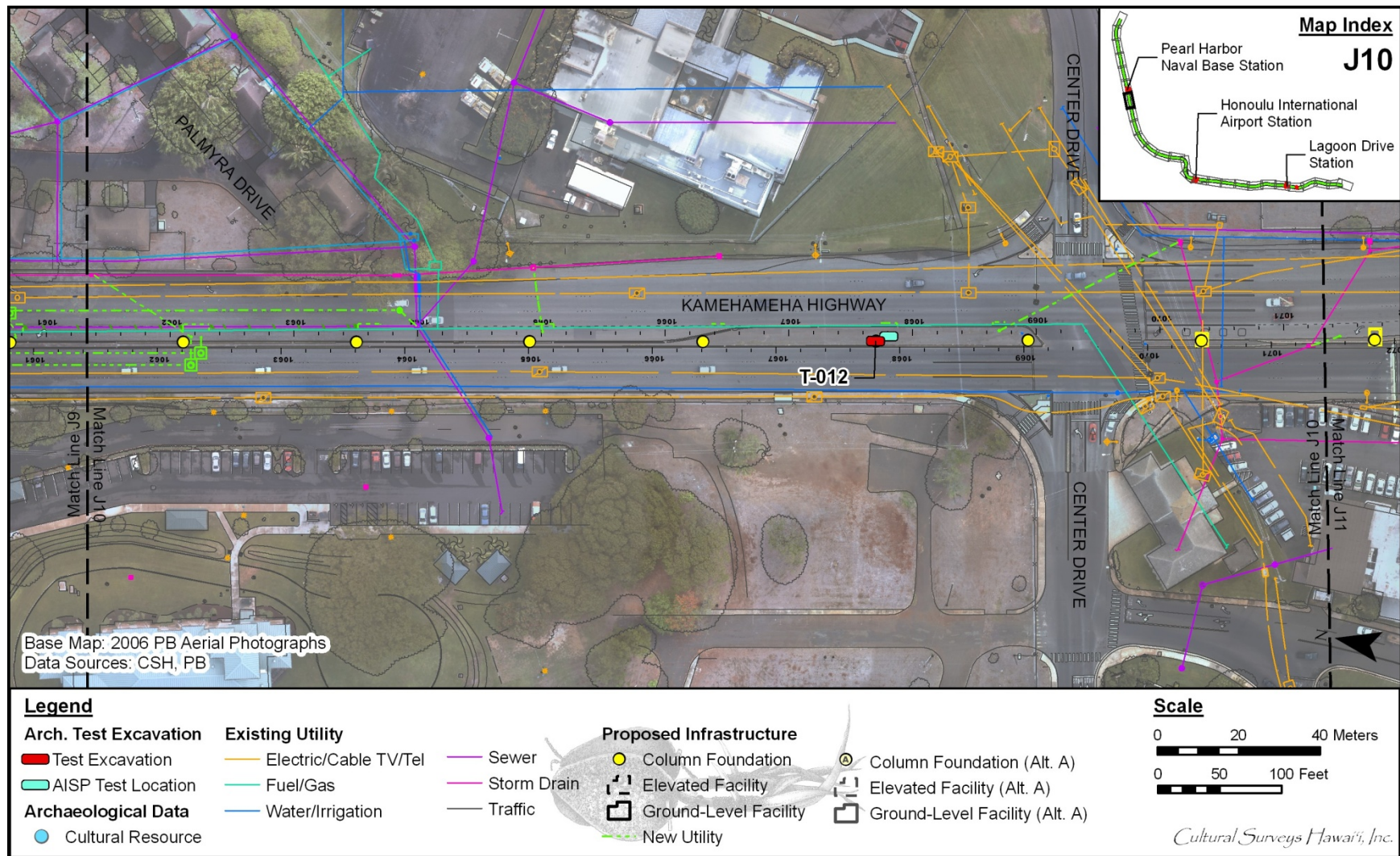


Figure 18. Map Sheet J10 (near Center Drive), one test excavation (T-012) at column foundation @ 1056+50

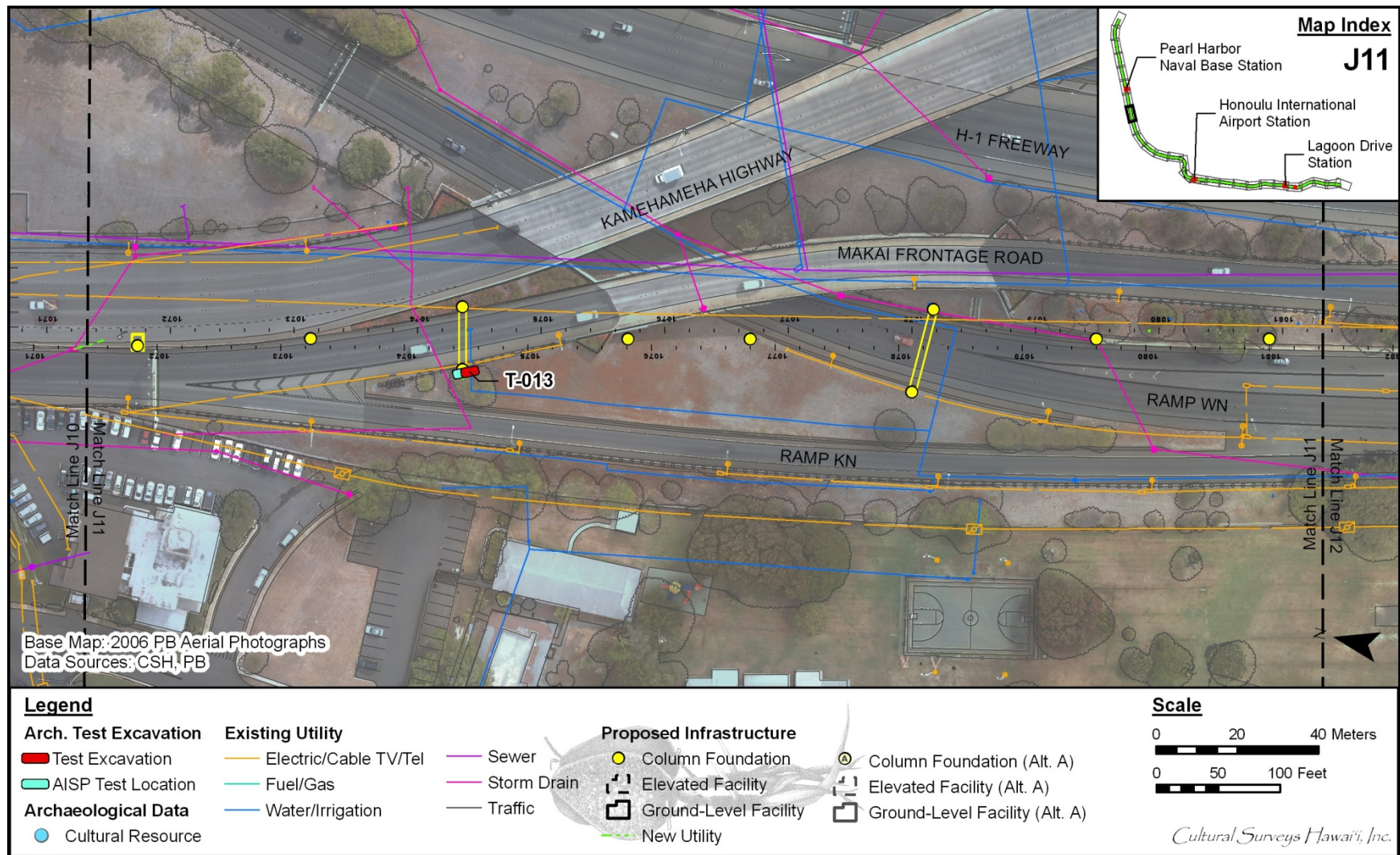


Figure 19. Map Sheet J11 (near Makai Frontage Road), one test excavation (T-013) at makai column foundation @ 1063+00

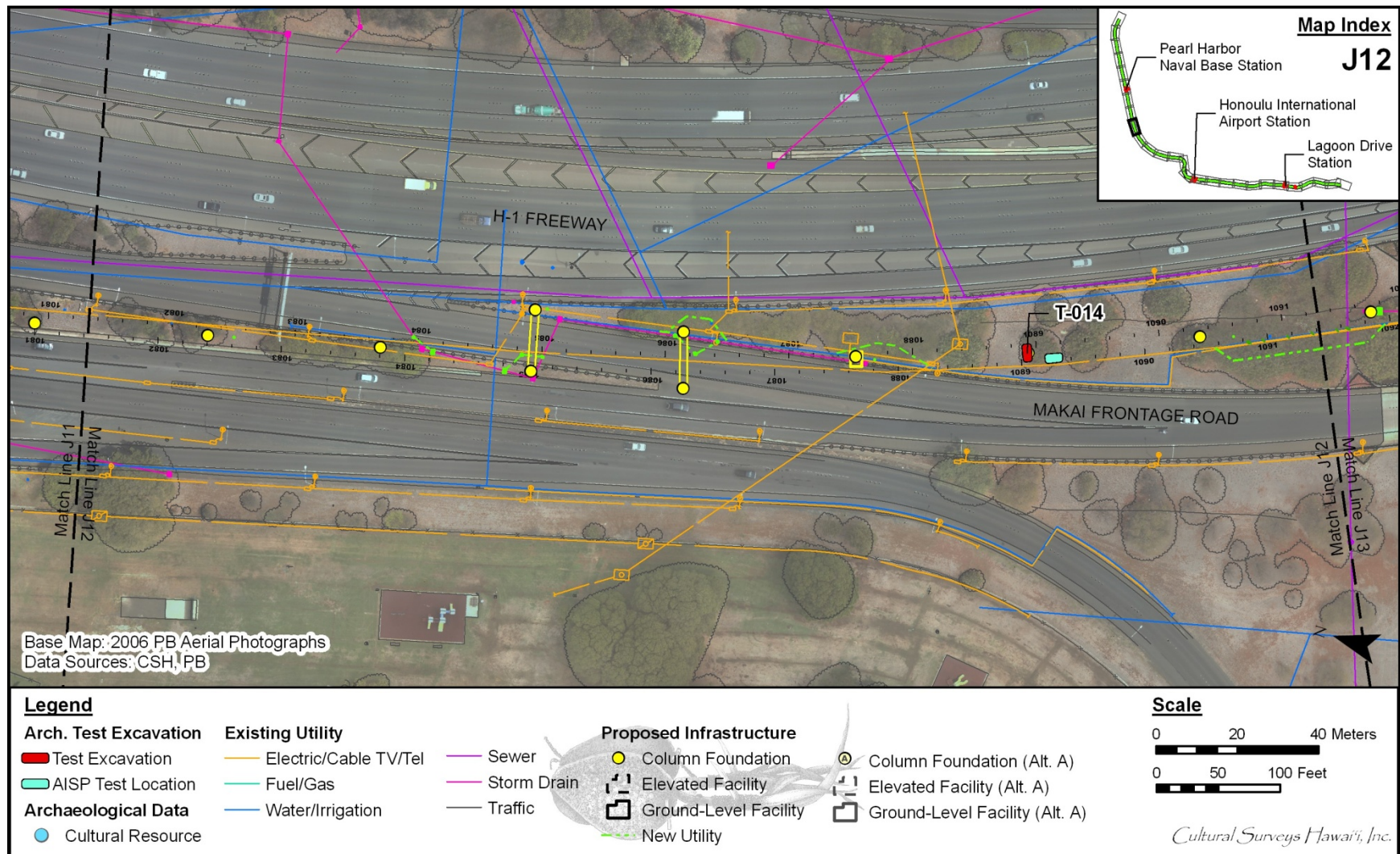


Figure 20. Map Sheet J12, one test excavation (T-014) at column foundation @ 1077+80

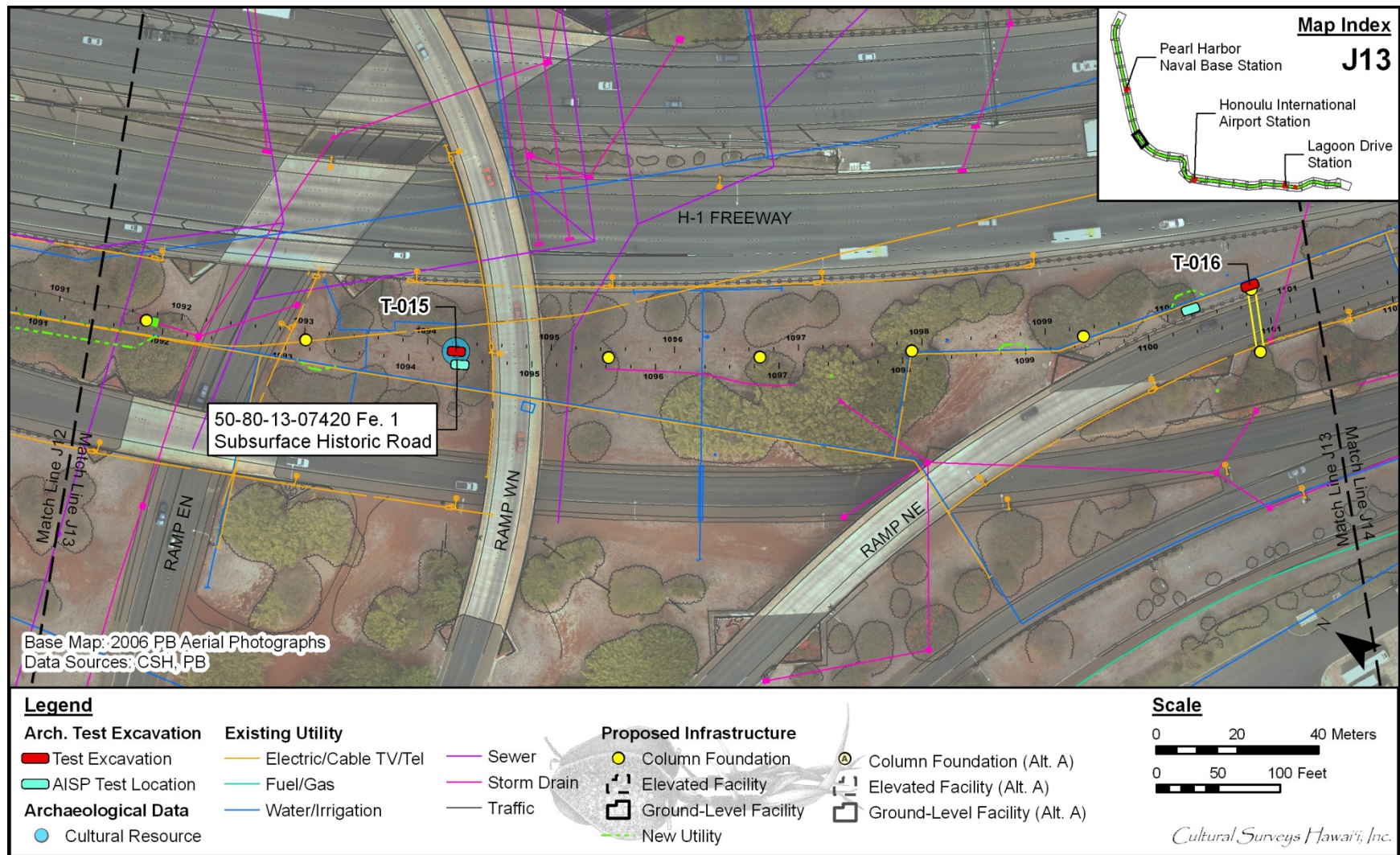


Figure 21. Map Sheet J13, two column foundation test excavations (T-015 and T-016) @ 1083+00 & (mauka) 1089+00

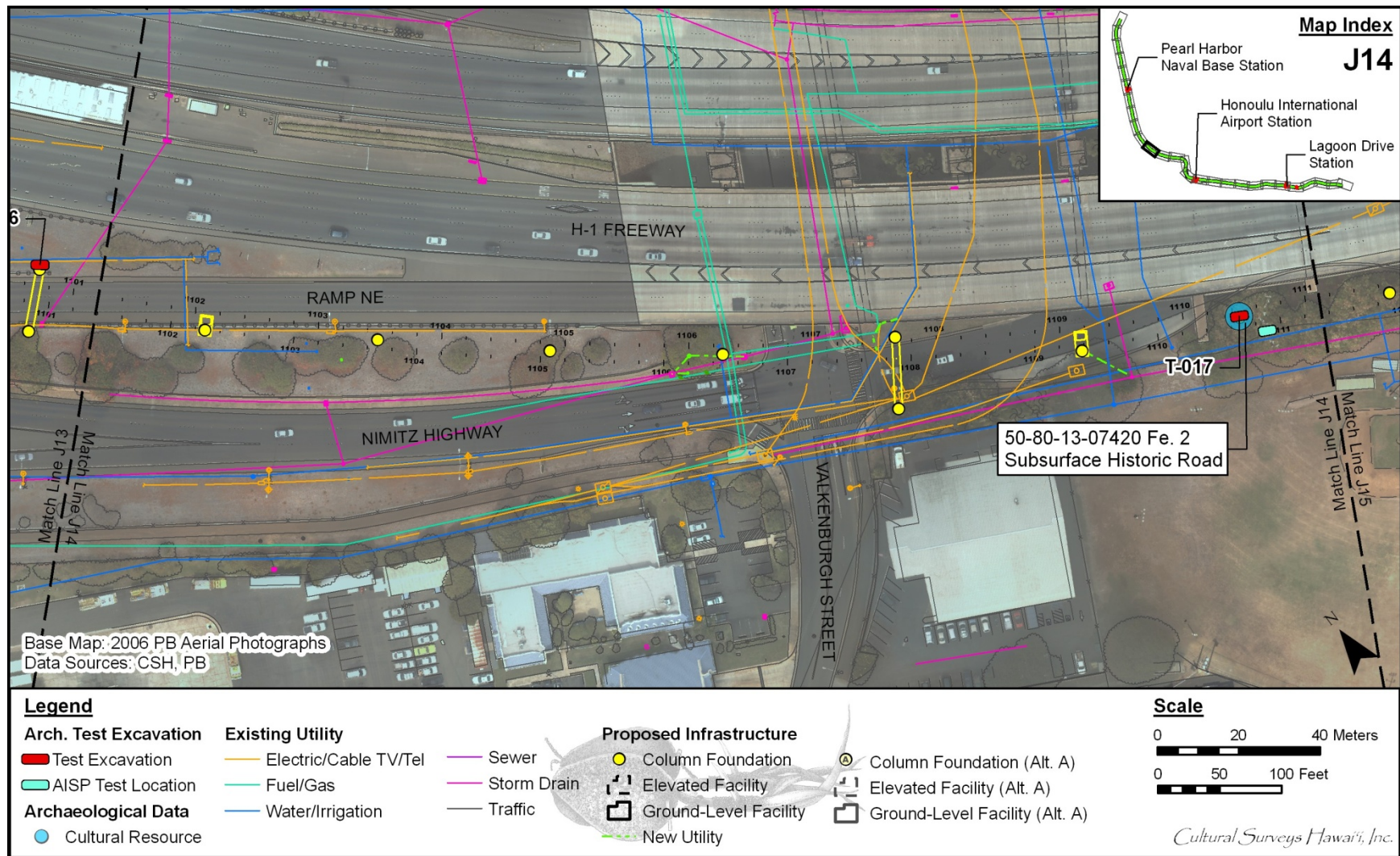


Figure 22. Map Sheet J14, one test excavation (T-017) at column foundation @ 1099+50

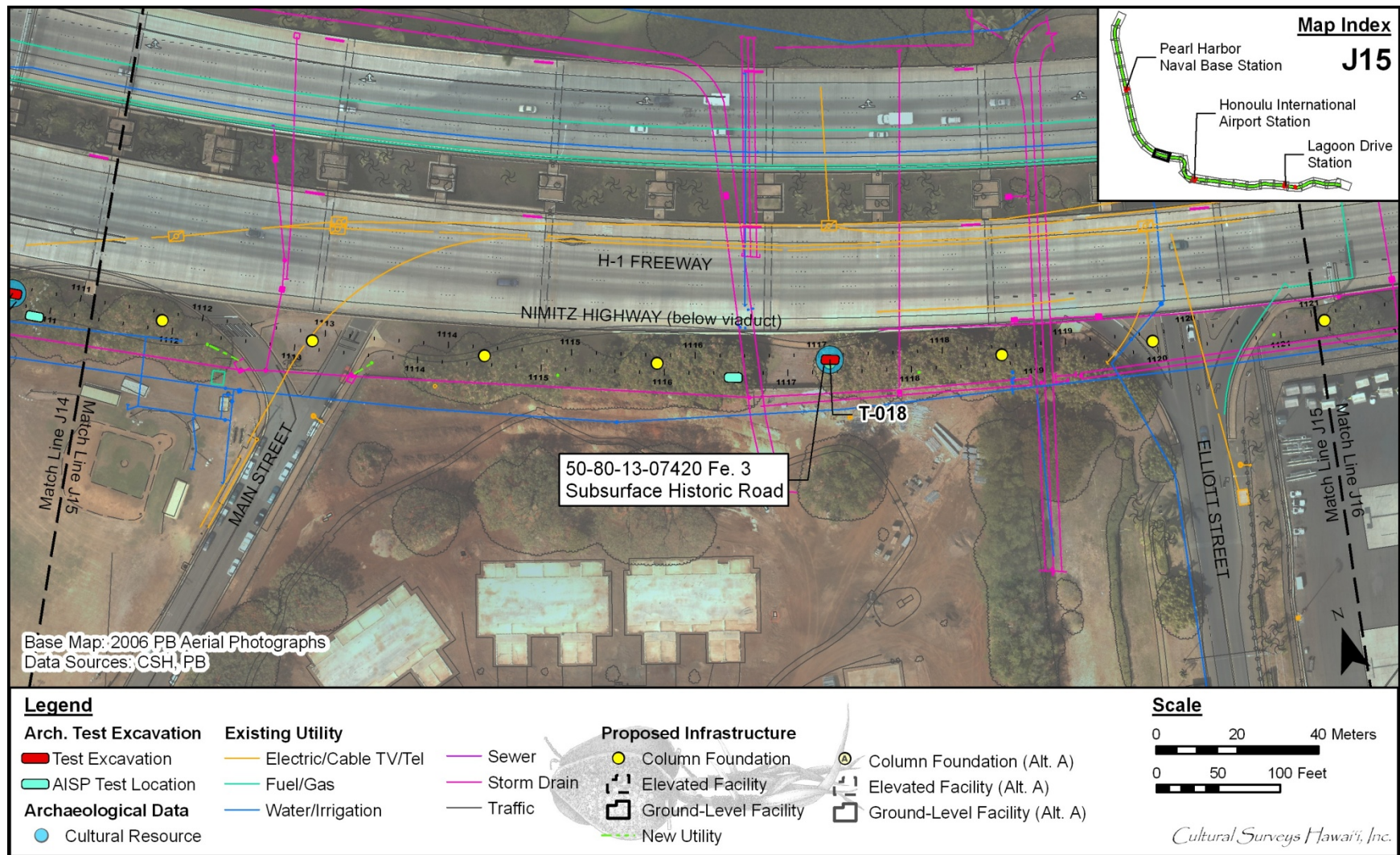


Figure 23. Map Sheet J15, one test excavation (T-018) at column foundation @ 1105+20

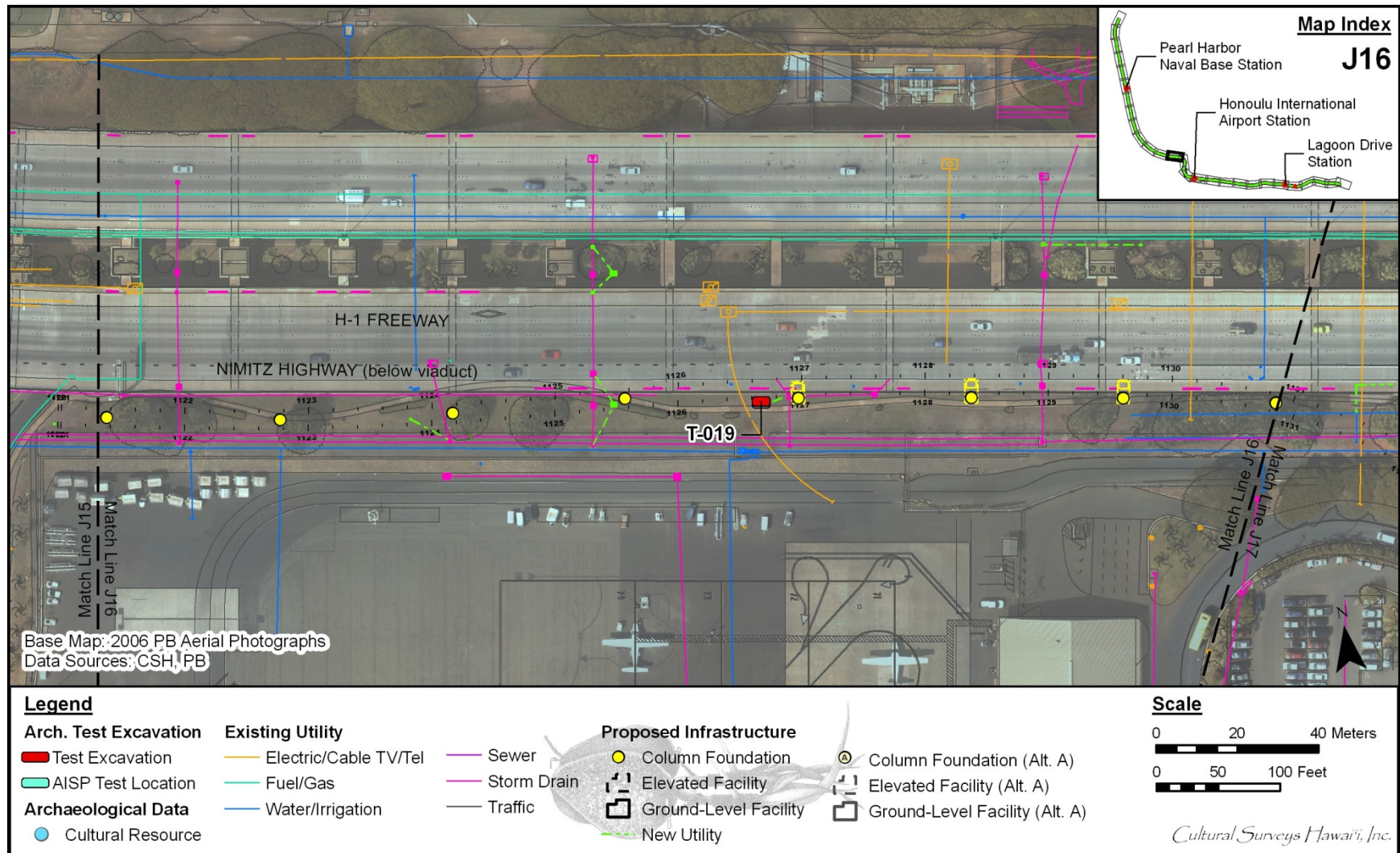


Figure 24. Map Sheet J16, one test excavation (T-019) at (*makai*) column foundation @ 1115+30

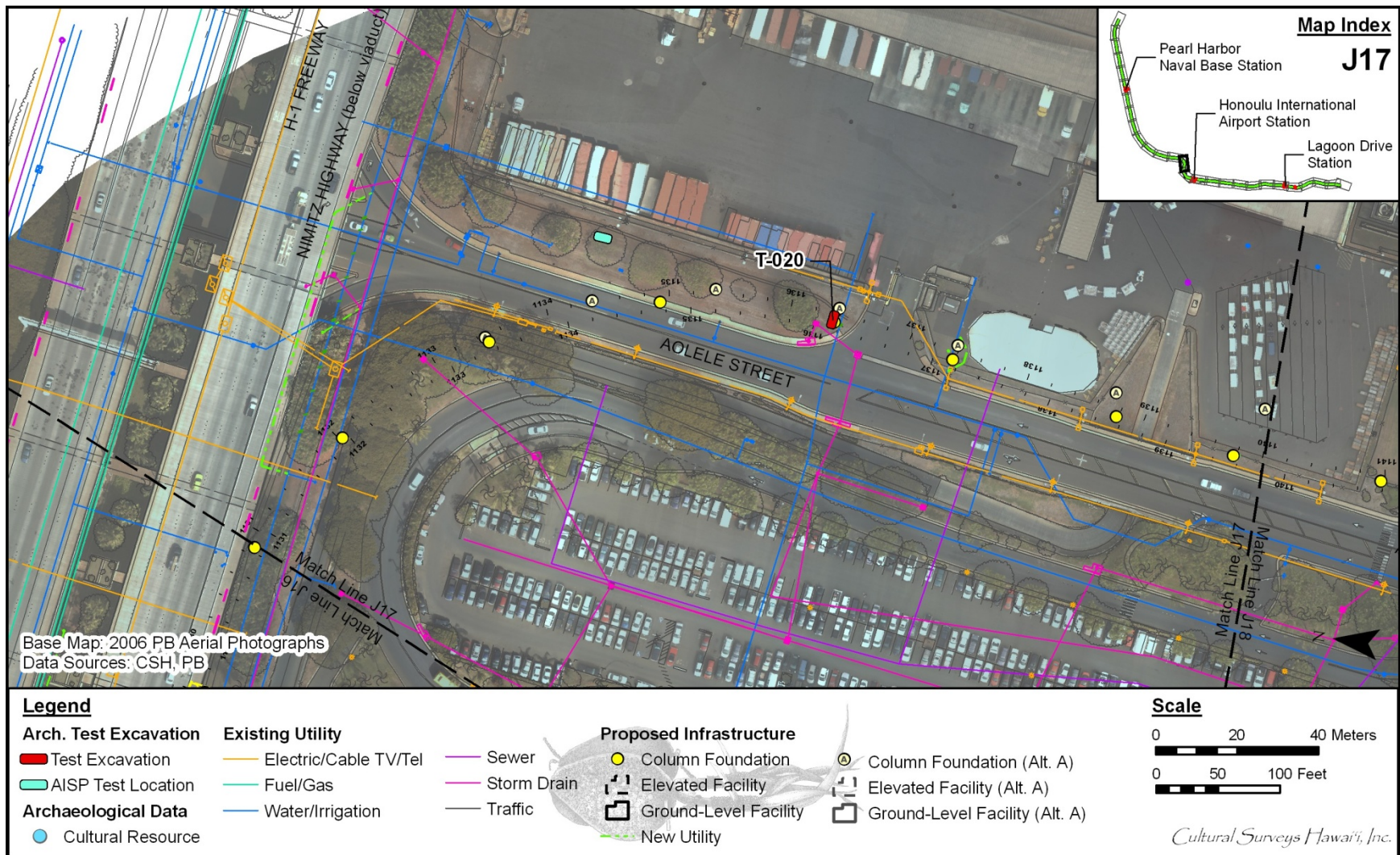


Figure 25. Map Sheet J17, one test excavation (T-020) at column foundation @ 1124+30

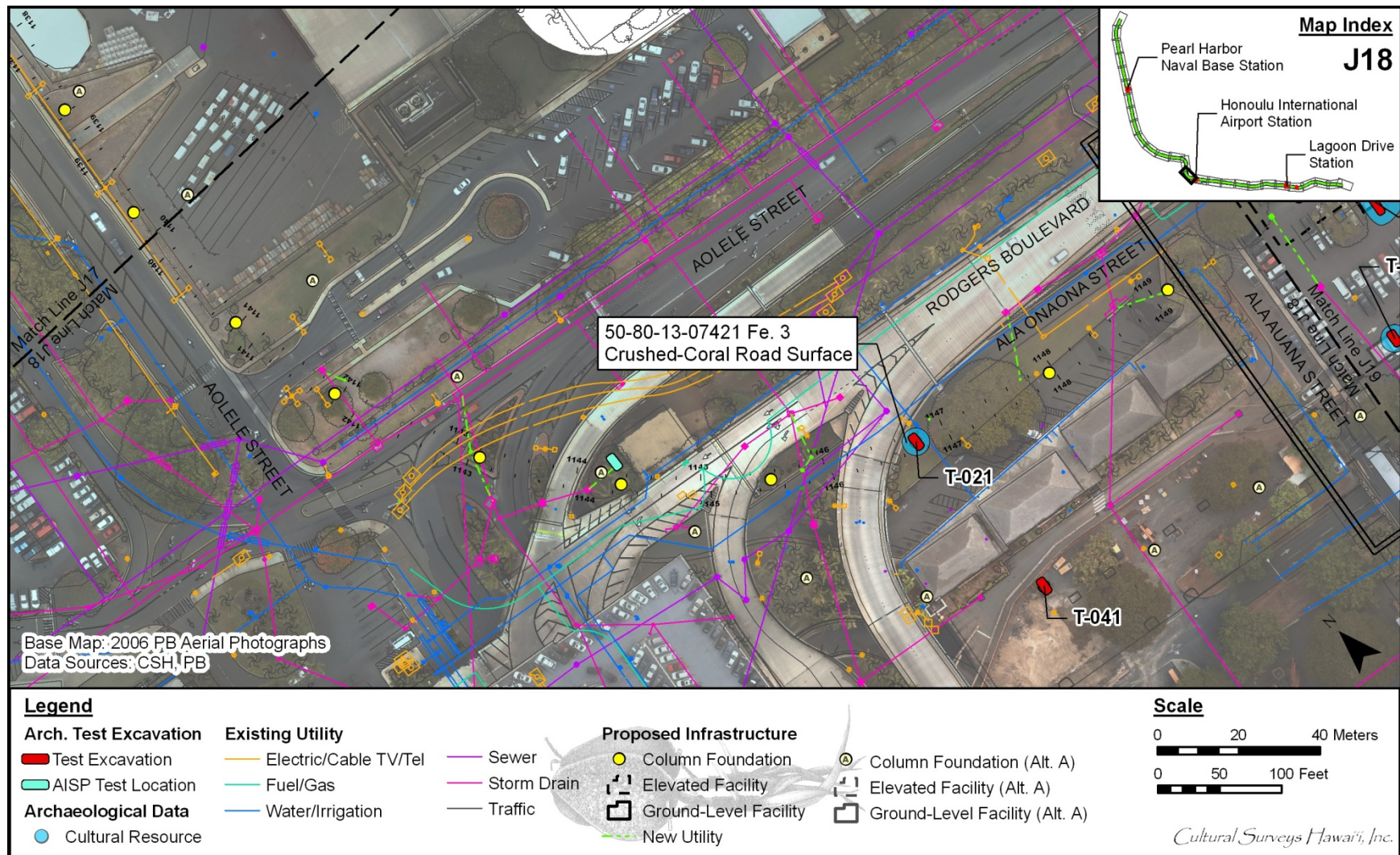


Figure 26. Map Sheet J18, two test excavations (T-021 and T-041) at column foundation @ 1134+30

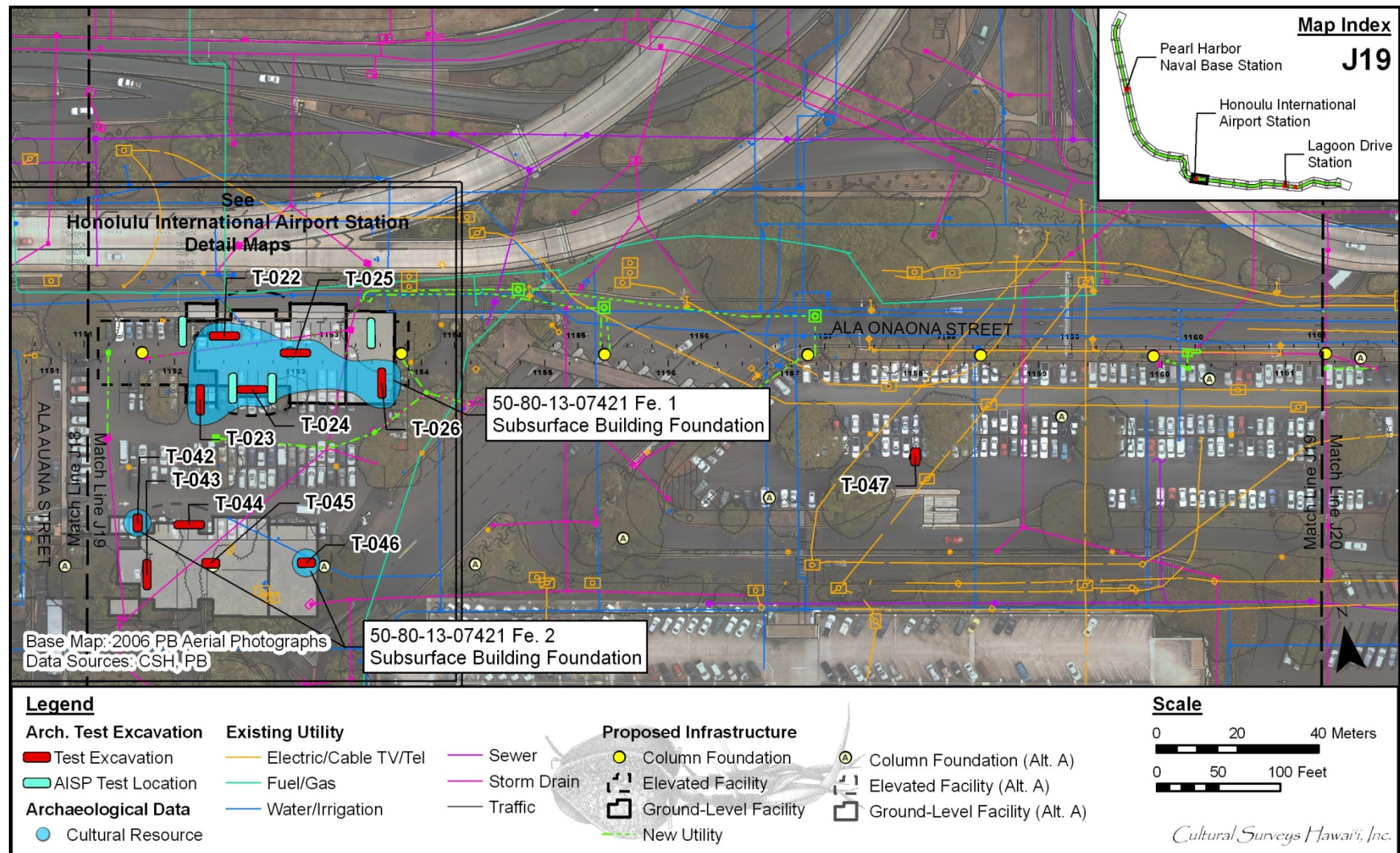


Figure 27. Map Sheet J19 (south of Ala Onaona Street), one test excavation (T-047) outside of the Honolulu International Airport Station area

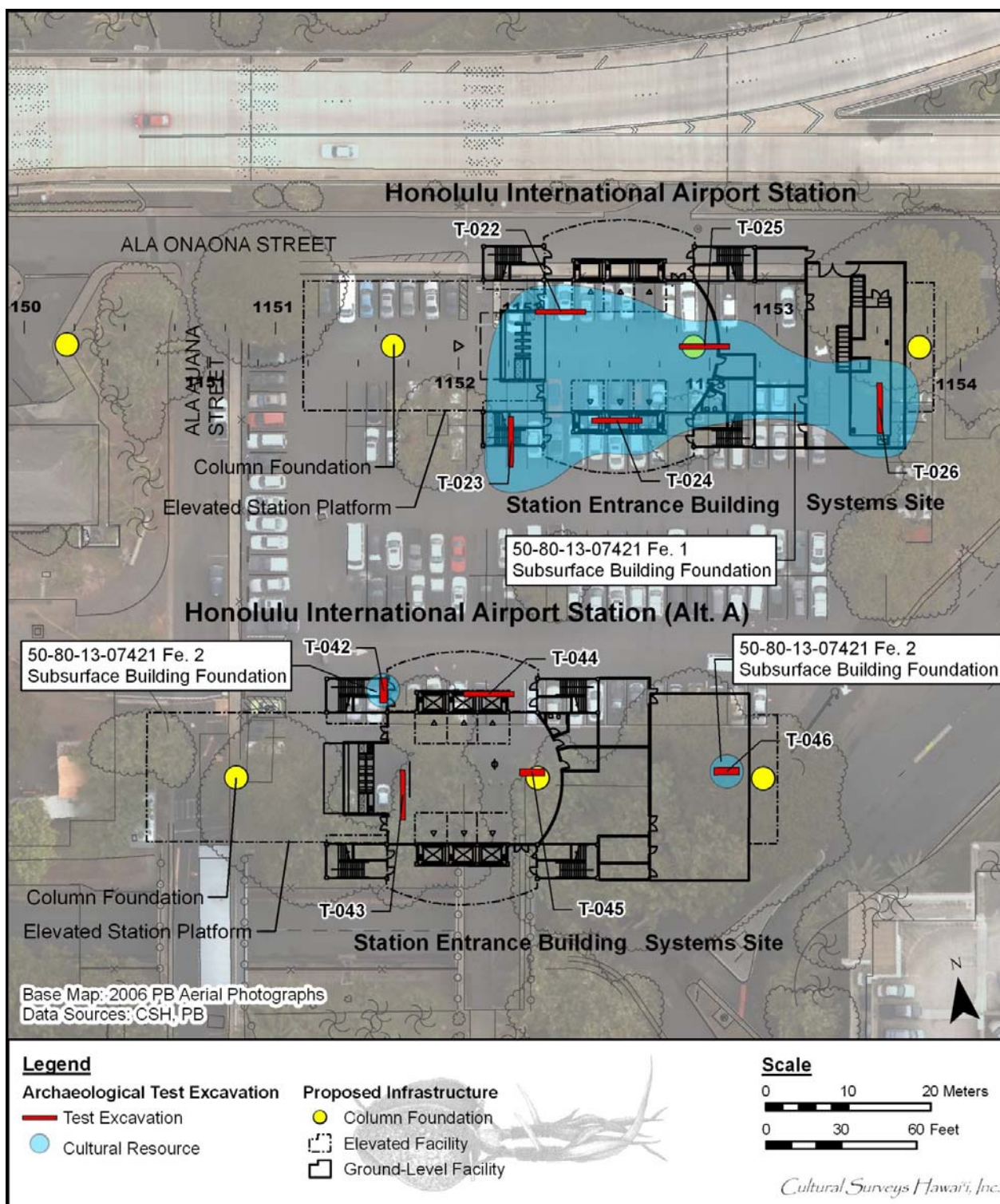


Figure 28. Map Sheet J19, original Honolulu International Airport Station with five test excavations (T-022 through T-026) and Honolulu International Airport Station Alternate A to the south with five test excavations (T-042 through T-046)

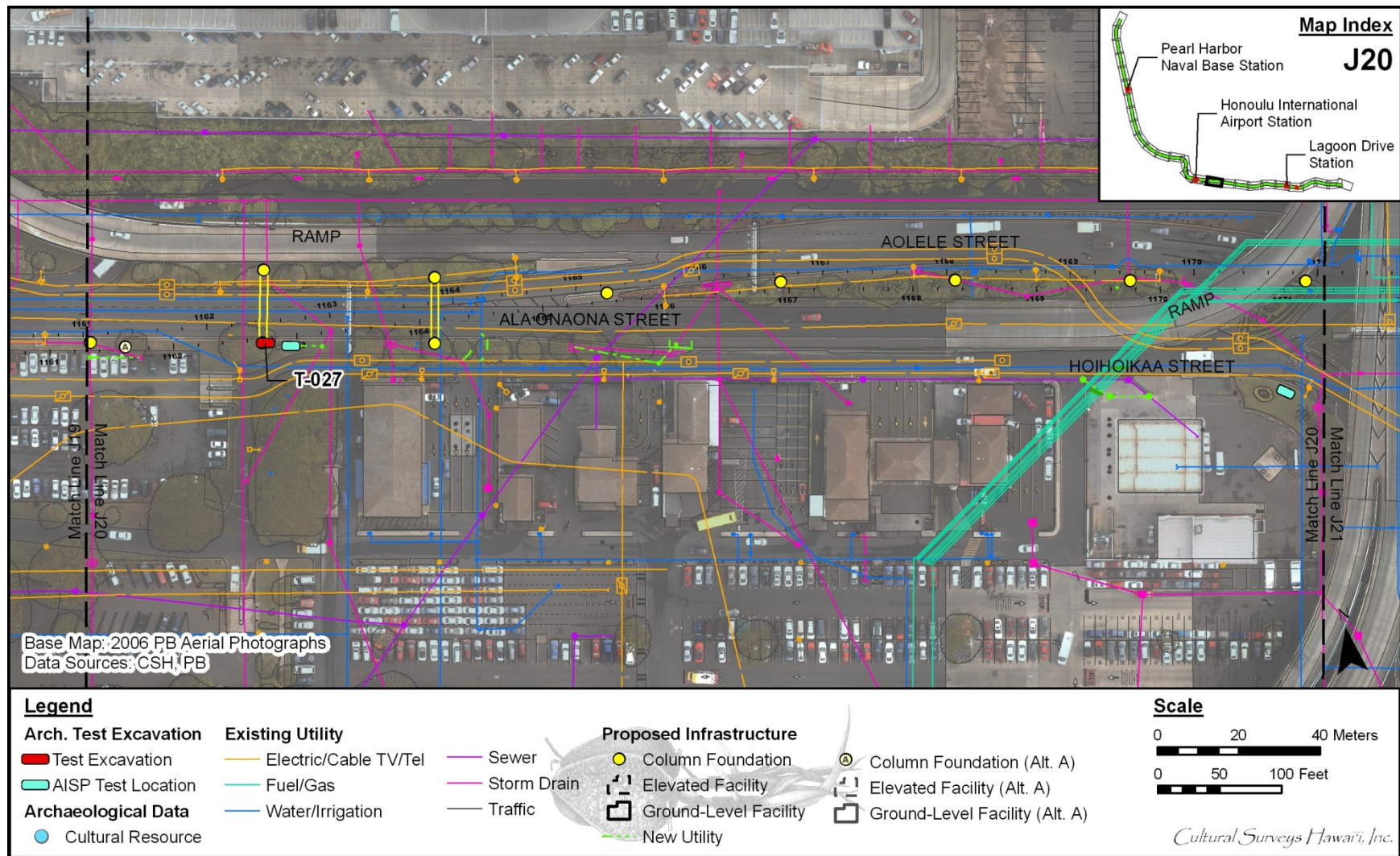


Figure 29. Map Sheet J20, one column foundation test excavation (T-027) @ 1151+60

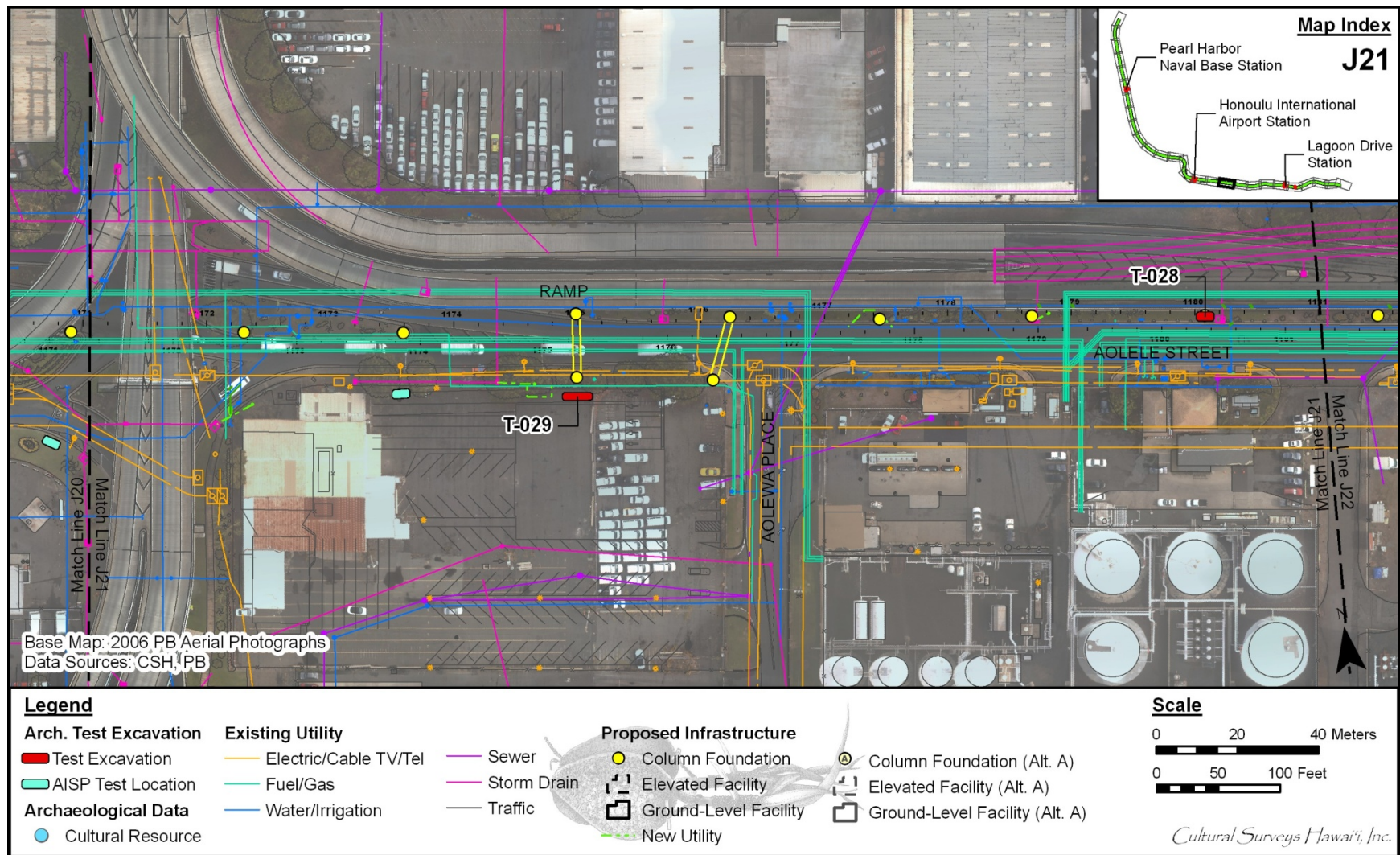


Figure 30. Map Sheet J 21 (along Aolele Street), two test excavations (T-028 and T-029) at (makai) column foundation @ 1162+50

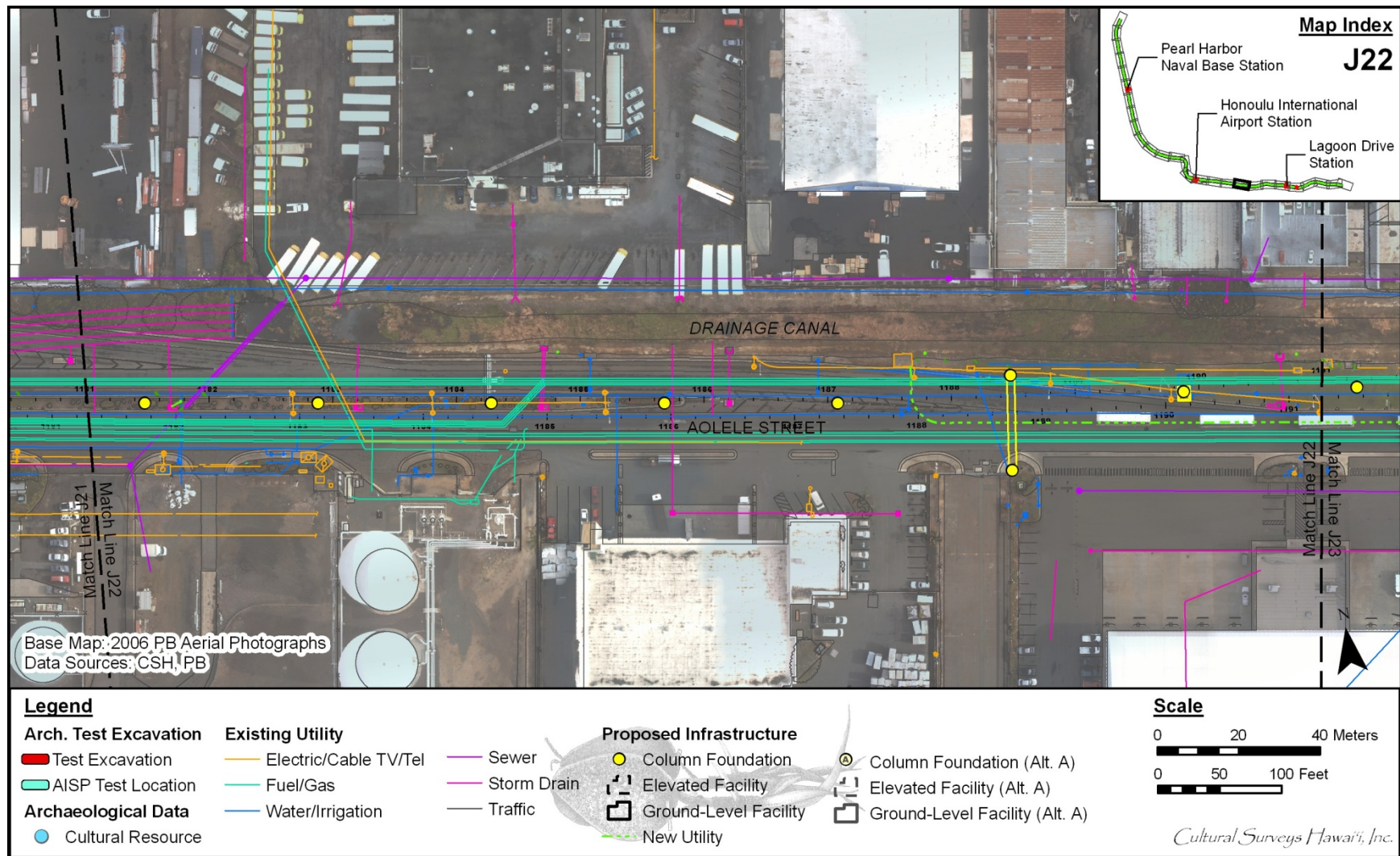


Figure 31. Map Sheet J22, no test excavations

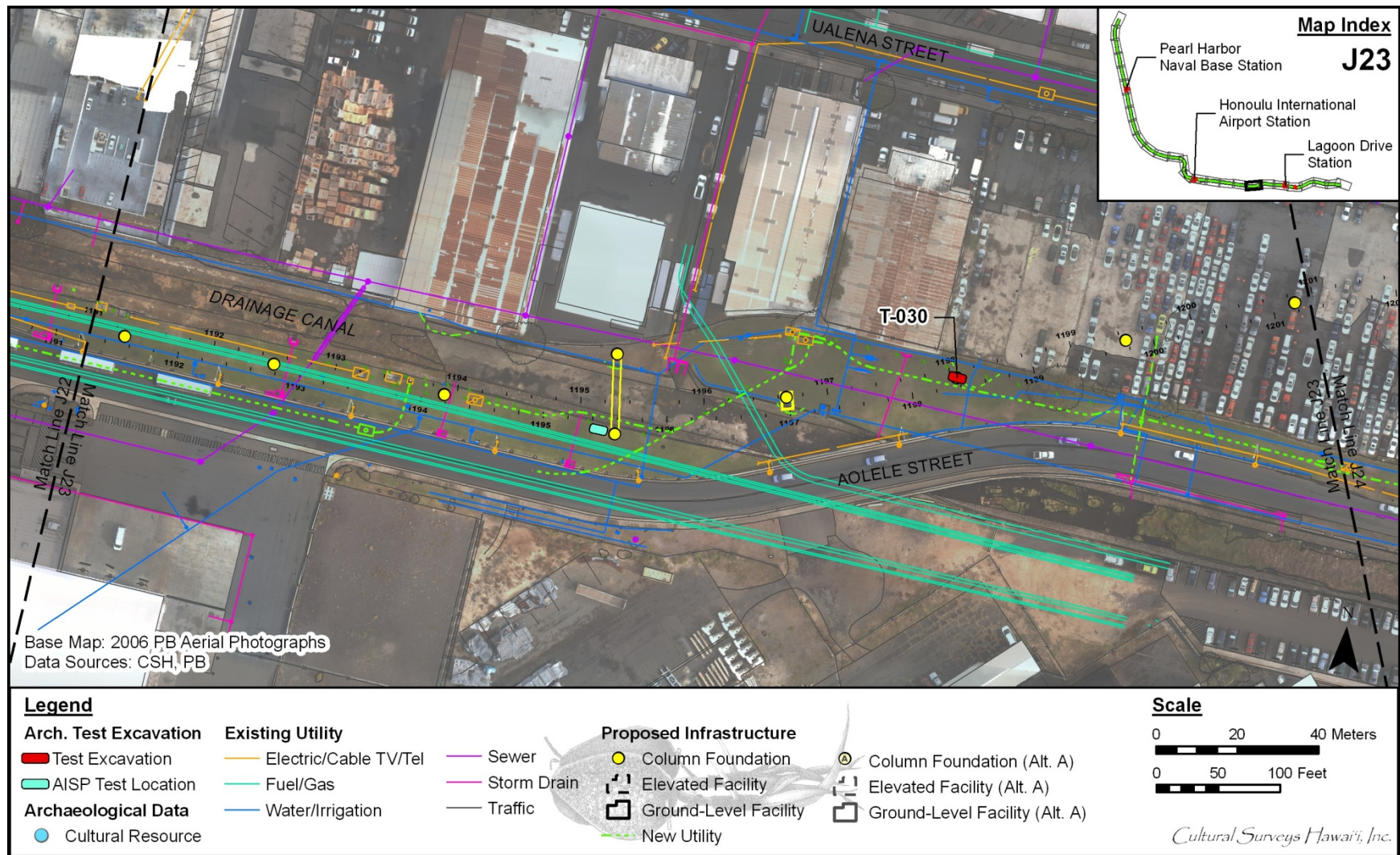


Figure 32. Map Sheet J23, one test excavation (T-030) at (*makai*) column foundation @ 1184+20



Figure 33. Map Sheet J24, one test excavation (T-031) at (*makai*) column foundation @ 1194+50

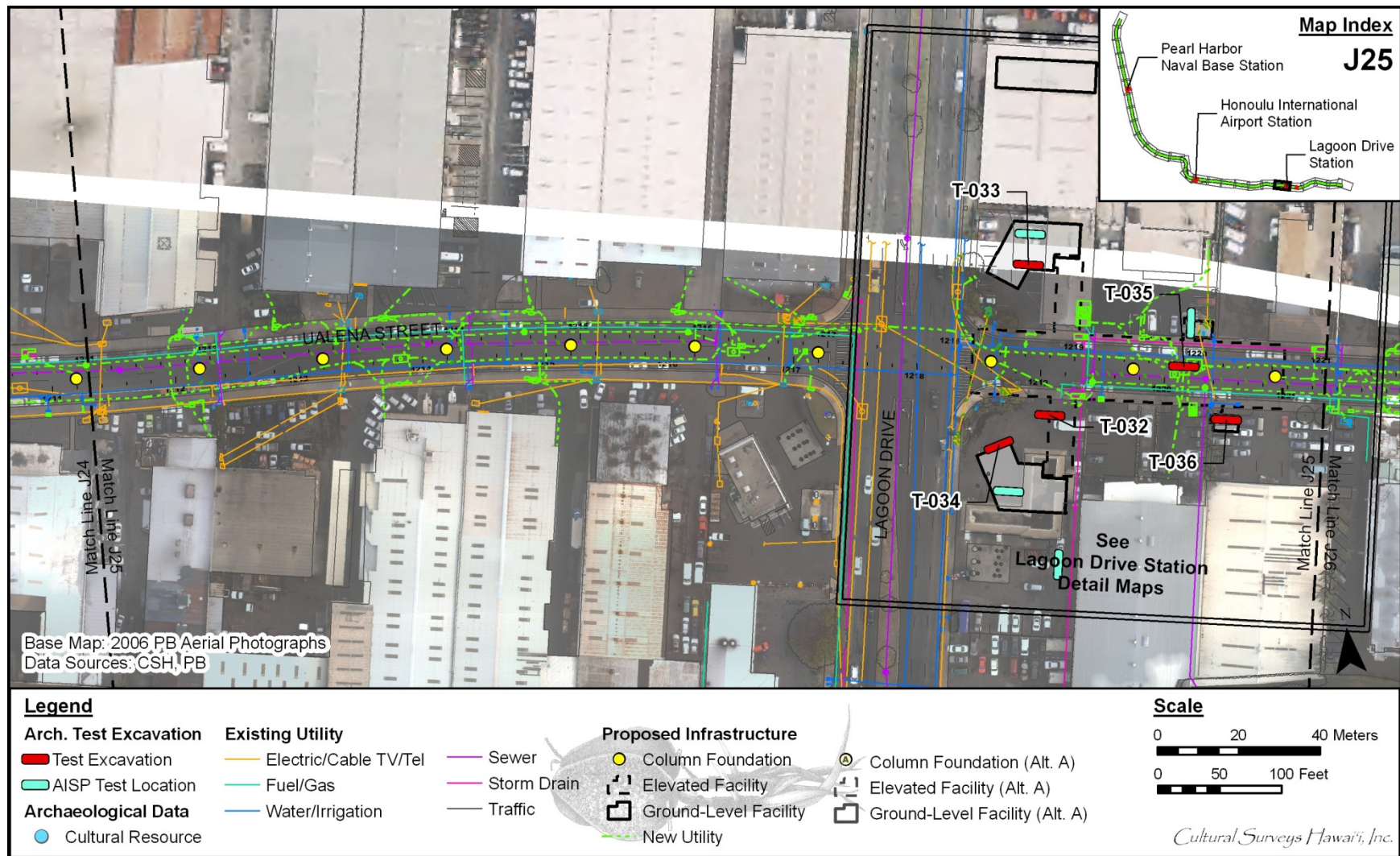


Figure 34. Map Sheet J25, no test excavations (see Station testing layout on following figure)

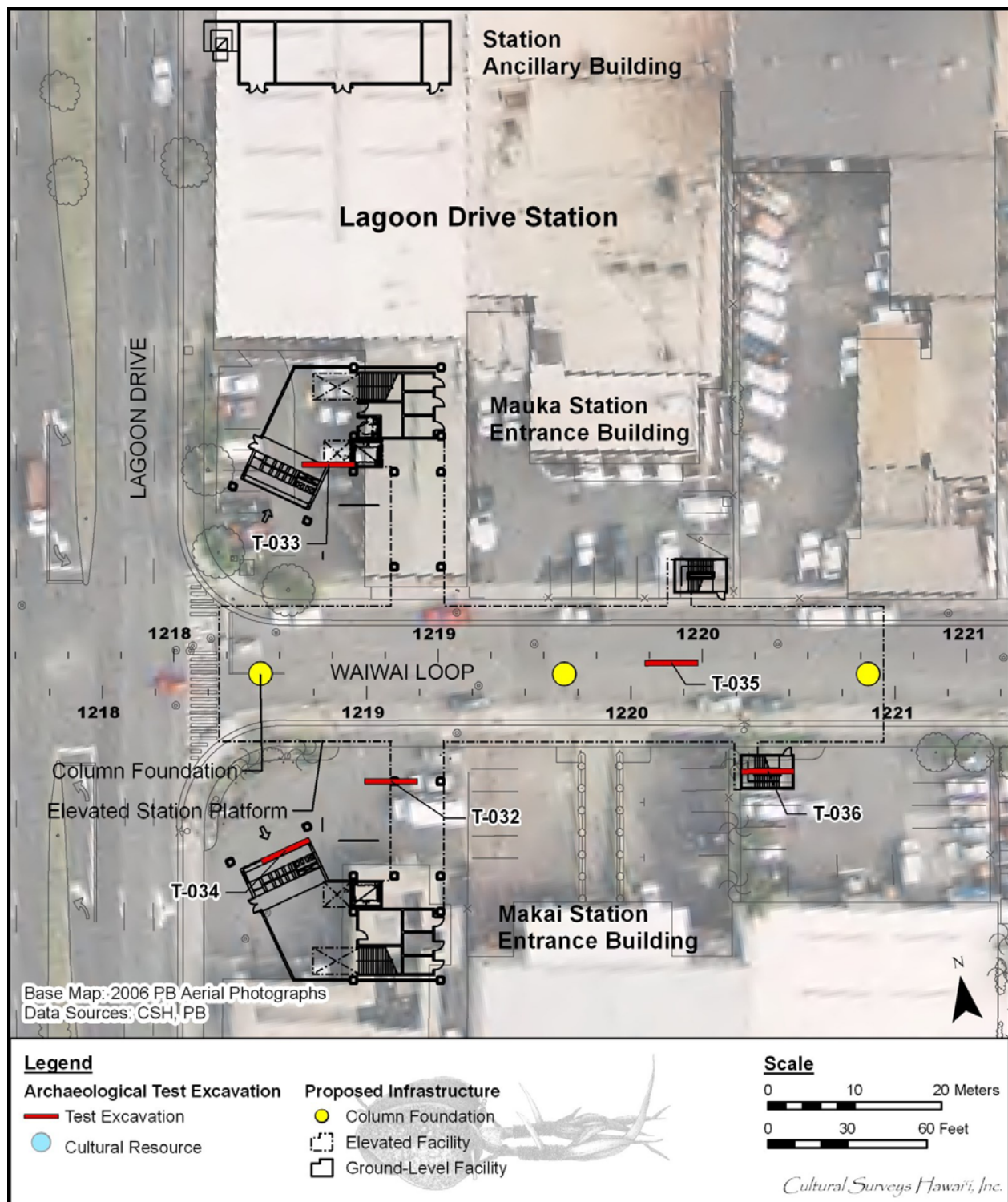


Figure 35. Lagoon Drive Station, five test excavations (T-032 through T-036); two test excavations at Mauka Station Entrance Building, one test excavation at *mauka* access and two at Makai Station Entrance Building

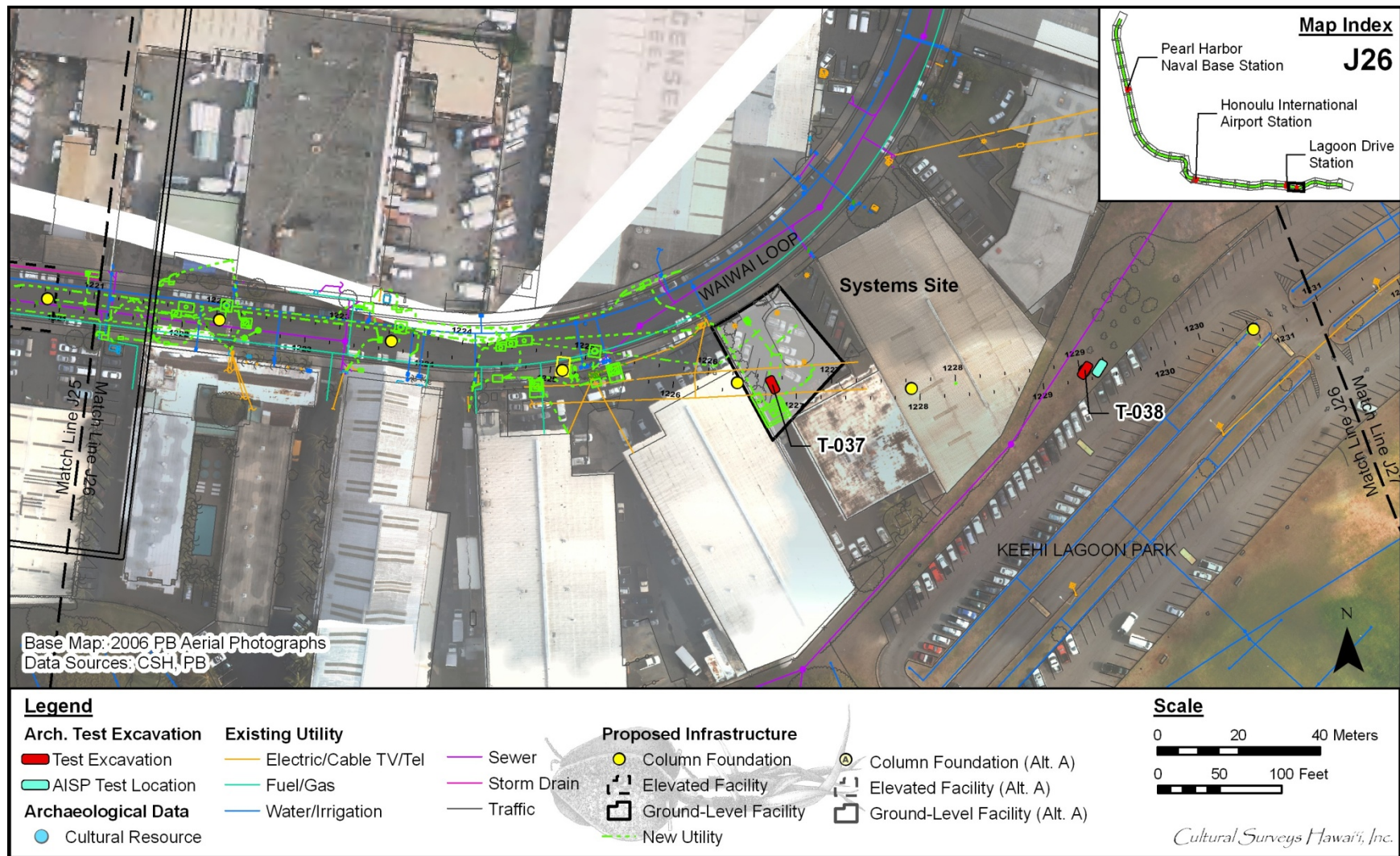


Figure 36. Map Sheet J26, two test excavations (T-037 and T-038) at column foundations @ 1215+50 & 1218+20

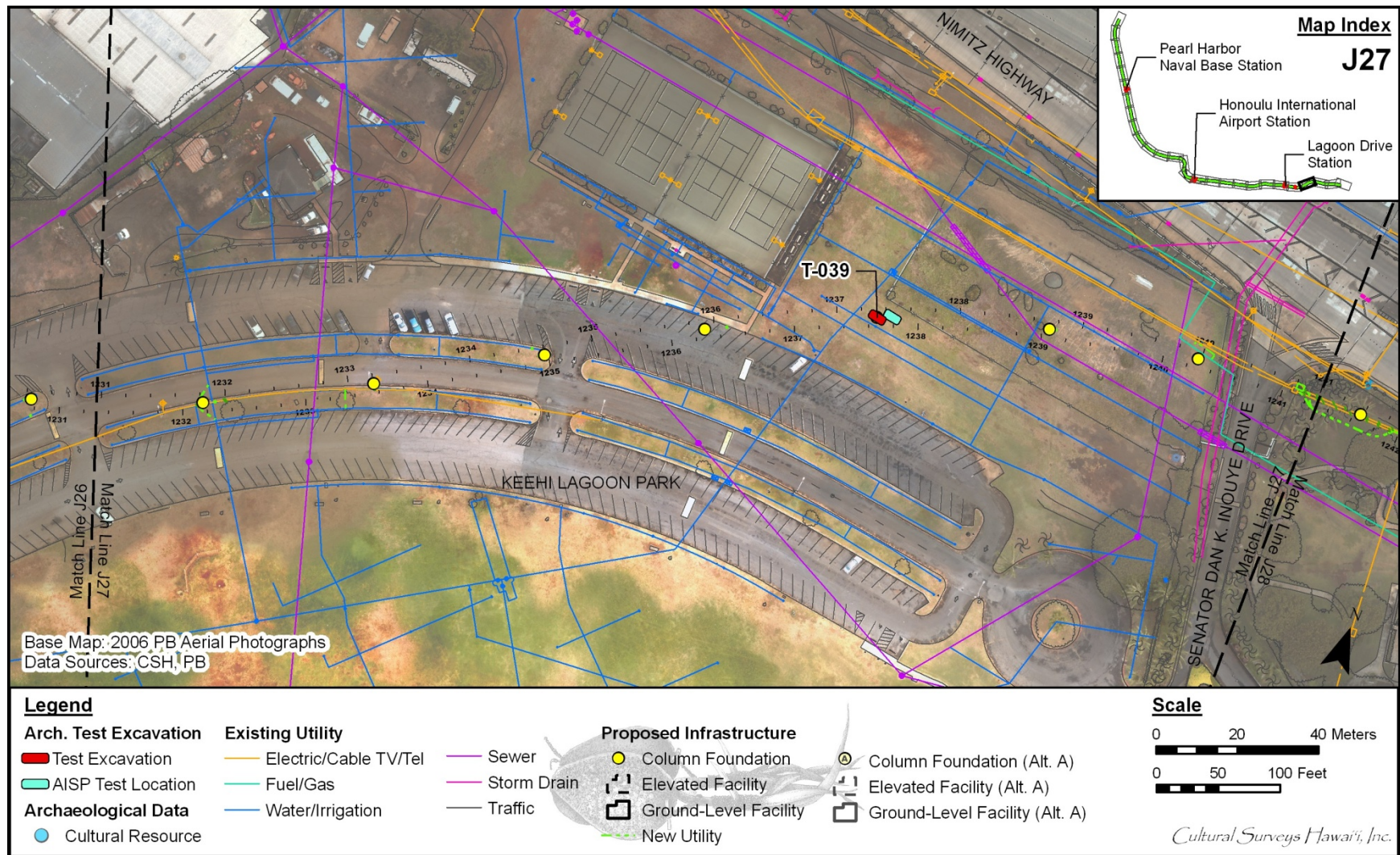


Figure 37. Map Sheet J27, one test excavation (T-039) at column foundation @ 1226+50

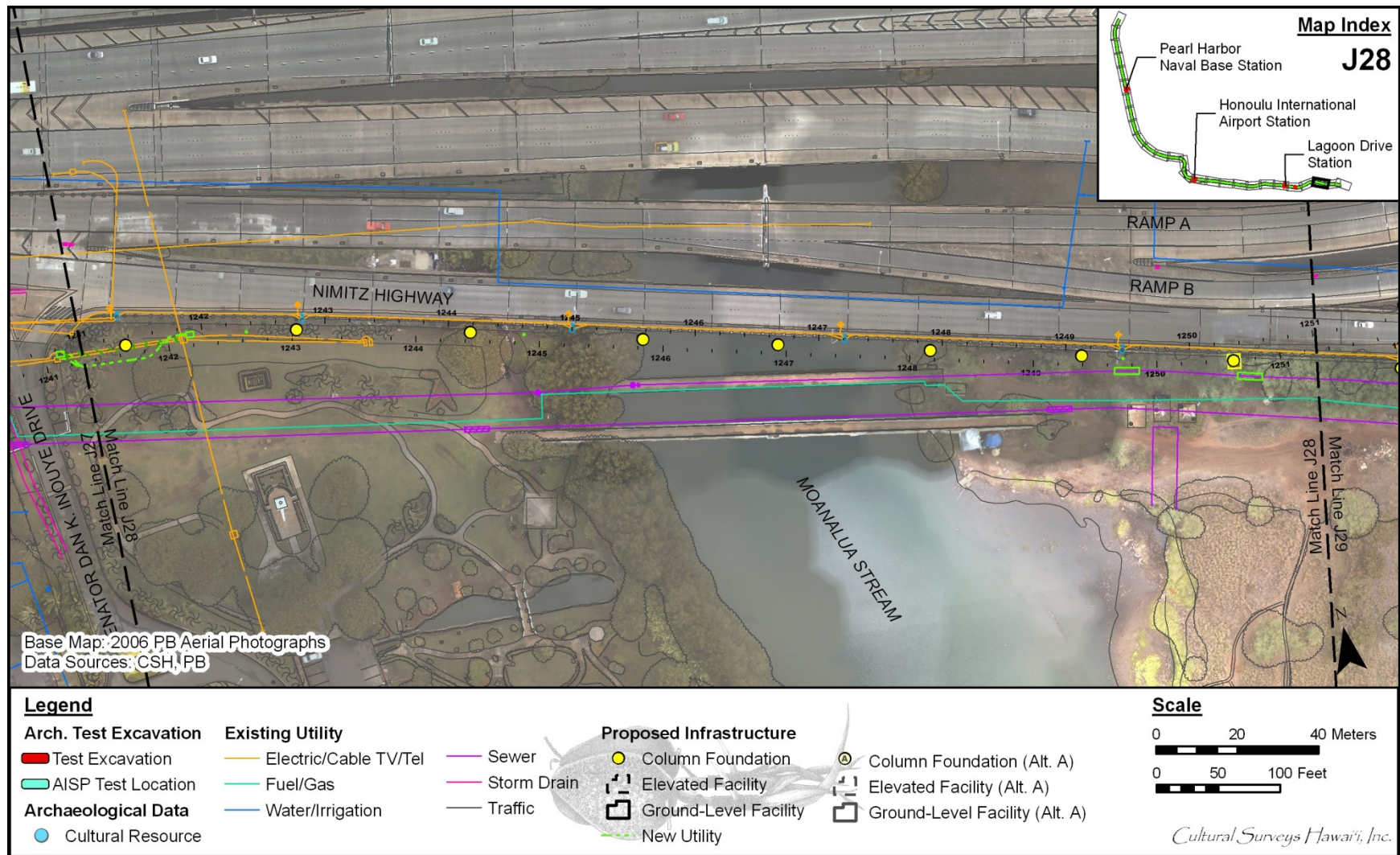


Figure 38. Map Sheet J28, no test excavations

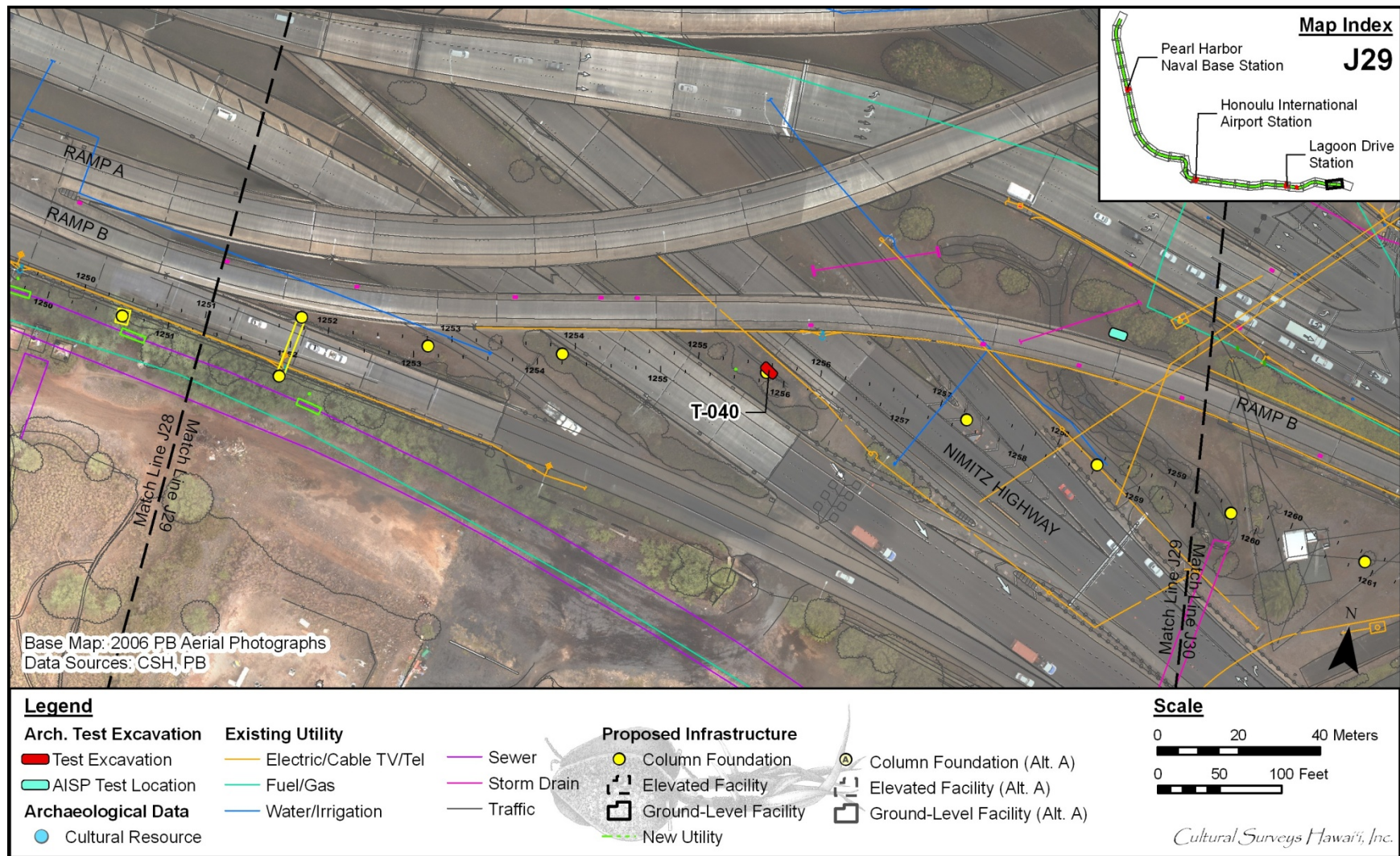


Figure 39. Map Sheet J29, one test excavation (T-040) at column foundation @ 1247+50

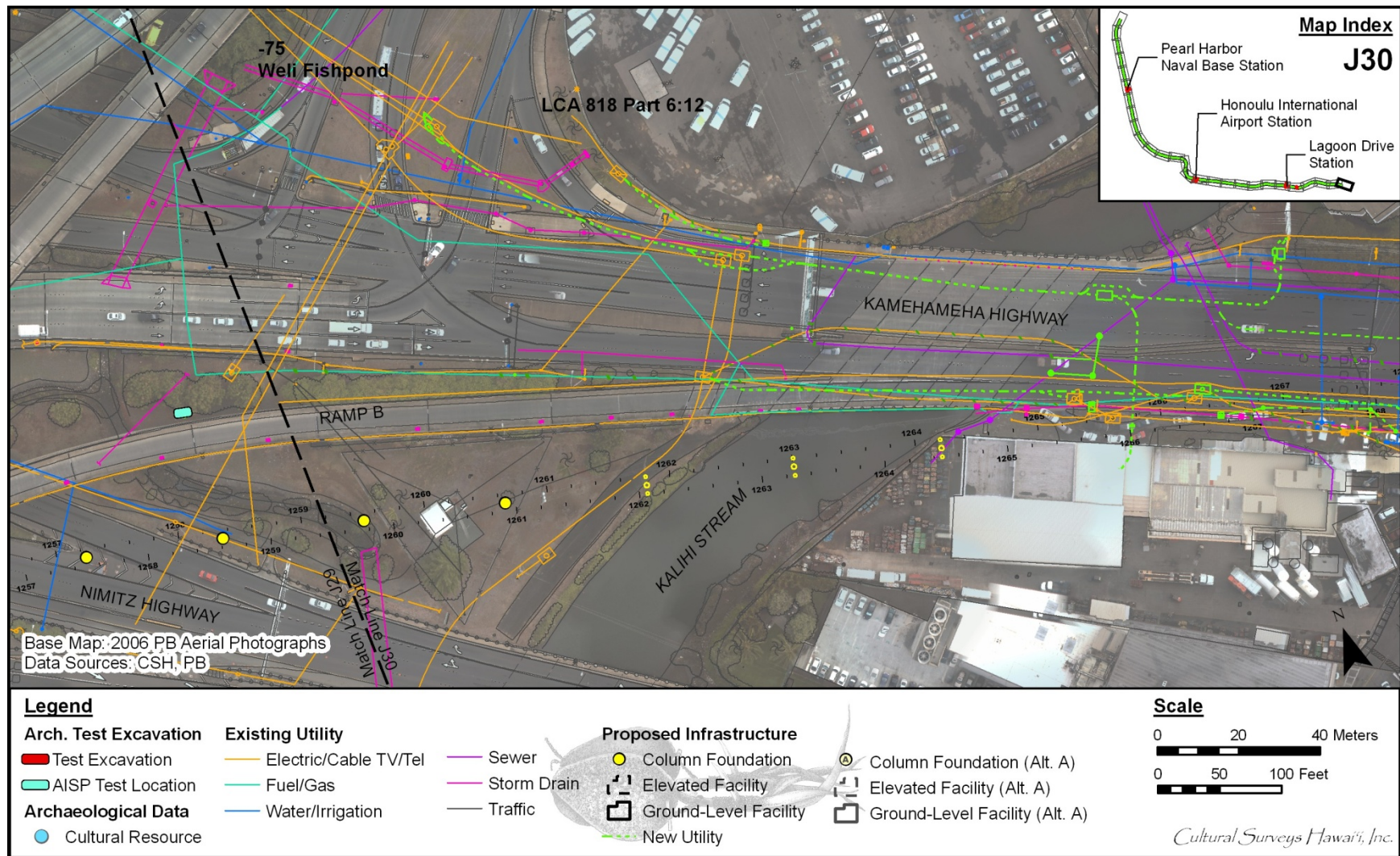


Figure 40. Map Sheet J30, connecting to the AISP for City Center Section 4 by Kalihi Stream

Table 6. Test Excavation Locations and Settings

FID*	Excavation Type	Dimensions (ft)	Location	Map Sheet	Area (sq ft)	Setting	Property Type	Street	Owner
0	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
1	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
2	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
3	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
4	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
5	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
6	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
7	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
8	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
9	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
10	Station Building	20x2	Lagoon Drive Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:014)	Waiwai Loop	CHEVRON USA INC
11	Station Building	20x2	Lagoon Drive Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:014)	Waiwai Loop	CHEVRON USA INC
12	Station Building	20x2	Lagoon Drive Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:015)	Waiwai Loop	BREWER, JOHN V BREWER TR
13	Station Building	20x2	Lagoon Drive Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:016)	Waiwai Loop	INTERNATIONAL EXPRESS INC
14	Station Building	20x2	Lagoon Drive Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:012)	Waiwai Loop	WINDOW WORLD INC
15	Guideway Column	20x2	EB 994+40	J4	40	Paved/Landscaped Area	State Highway / Private (TMK 9-9-003:066)	Kamehameha Highway	STATE DOT / HARRY B KRONICK TRUST
16	Guideway Column	20x2	EB 996+70	J4	40	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
17	Guideway Column	10x3	EB 1003+60	J5	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
18	Guideway Column	10x3	EB 1004+90	J5	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
19	Guideway Column	10x3	EB 1032+40	J8	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
20	Guideway Column	10x3	EB 1056+50	J10	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
21	Utility Relocation (24" Storm Drain)	20x2	EB 1043+90	J9	40	Paved/Landscaped Area	State Street	Radford Drive	USA
22	Guideway Column	10x3	EB 1063+00	J11	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
23	Guideway Column	10x3	EB 1077+80	J12	30	Paved/Landscaped Area	State Highway	H-1 Freeway	STATE DOT
24	Guideway Column	10x3	EB 1083+00	J13	30	Paved/Landscaped Area	State Highway	H-1 Freeway	STATE DOT
25	Guideway Column	10x3	EB 1089+00	J13	30	Paved/Landscaped Area	State Highway	H-1 Freeway	STATE DOT
26	Guideway Column	10x3	EB 1099+50	J14	30	Paved/Landscaped Area	State Highway	Nimitz Highway	STATE DOT
27	Guideway Column	10x3	EB 1105+20	J15	30	Paved/Landscaped Area	State Highway	Nimitz Highway	STATE DOT
28	Guideway Column	10x3	EB 1115+30	J16	30	Paved/Landscaped Area	State Highway	Nimitz Highway	STATE DOT
29	Guideway Column	10x3	EB 1124+30	J17	30	Paved/Landscaped Area	Federal (TMK 1-1-002:001)	Aolele Street	US POSTAL SERVICE
30	Guideway Column	10x3	EB 1134+30	J18	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Aolele Street	STATE DOT AIRPORTS

FID*	Excavation Type	Dimensions (ft)	Location	Map Sheet	Area (sq ft)	Setting	Property Type	Street	Owner
									DIVISION
31	Guideway Column	10x3	EB 1151+60	J20	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
32	Guideway Column	10x3	EB 1159+70	J20	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Hoihoikaa Street	STATE DOT AIRPORTS DIVISION
33	Guideway Column	10x3	EB 1162+50	J21	30	Paved/Landscaped Area	State (TMK 1-1-003:017)	Aolele Street	STATE DOT AIRPORTS DIVISION
34	Guideway Column	10x3	EB 1184+20	J23	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Aolele Street	STATE DOT AIRPORTS DIVISION
35	Guideway Column	10x3	EB 1194+50	J24	30	Paved/Landscaped Area	State (TMK 1-1-004:012)	Ualena Street	STATE DOT AIRPORTS DIVISION
36	Guideway Column	10x3	EB 1215+50	J26	30	Paved/Landscaped Area	Private (TMK 1-1-016:006)	Waiwai Loop	ALERT HOLDINGS GROUP INC
37	Guideway Column	10x3	EB 1218+20	J26	30	Paved/Landscaped Area	State (TMK 1-1-003:006)	Ke‘ehi Lagoon Park Road	STATE DOT AIRPORTS DIVISION
38	Guideway Column	10x3	EB 1226+50	J27	30	Paved/Landscaped Area	State (TMK 1-1-003:006)	Ke‘ehi Lagoon Park Road	STATE DOT AIRPORTS DIVISION
39	Guideway Column	10x3	EB 1247+50	J29	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT

* FID = Field Identification #

Decisions for Additional AIS Testing

The overall objective of the archaeological cultural resource identification activities described in the AISP was to locate and document archaeological cultural resources that could be affected by project construction. Once identified, these archaeological deposits were investigated and recorded in sufficient detail so that their significance could be assessed and the project's potential effect on significant archaeological deposits could be evaluated.

The AIS investigation also strove to provide information to project engineers that would allow for the avoidance of significant archaeological deposits, particularly burials, during the Airport Segment 3 construction. The current sampling strategy was based on preliminary engineering, and the results of this Airport Section 3 AIS will help inform the interim and final engineering. There is some flexibility in the placement of the project's construction components, for example support columns can be shifted up to 30 feet parallel to the HHCTCP corridor alignment. Using this limited engineering flexibility for certain construction components, and the information from the AIS, the project engineers will attempt to find a design and engineering solution whereby project construction will avoid significant archaeological deposits. Only if no solution is possible will mitigation measures, such as archaeological data recovery, archaeological monitoring, and burial relocation, be considered.

The survey area for the Airport Section 3 AIS (and the APE) was confined to the area of direct, project-related ground disturbance. The AIS investigation was limited to that area. Accordingly, additional testing beyond the initial 40 test excavations, where determined appropriate, were located within the project footprint. Test excavations were not expanded outside of that footprint.

Additional AIS Testing at the Location of Archaeological Discovery

The actual number and location of additional testing locations in the vicinity of a find depended on various factors, including the type of archaeological resource found, the surrounding existing built environment, and the location based on preliminary engineering of project infrastructure planned for the location of the find. The actual number and location of additional testing locations was decided on a case-by-case basis, depending on these factors and in consultation with the City and SHPD.

Sampling Strategy Summary

The AISP served as a framework to guide the archaeological inventory survey work. This section details the subsurface sampling strategy that was the primary means of archaeological cultural resource inventory.

Archaeological test excavations at 47 locations were sampled within the Airport Section 3 corridor. All 47 excavations could be carried out with only minor deviations based on built environment constraints (e.g., existing utilities). The SHPD was kept in close consultation regarding specific excavation locations that needed to shift and the need for additional AIS testing locations.

The proposed 40 specific locations for archaeological test excavations described in the AISP were regarded as an initial systematic sampling strategy. As described above, finds of human

skeletal remains, and/or any other significant archaeological finds, and/or specific types of sediments were to lead to consultation regarding the need for additional testing. The anticipation was that any additional test excavations would be located within the preliminary engineering footprint of the project. Specific additional testing strategies were to be developed, if needed, in consultation with SHPD, the City, and project engineers. The only need for additional testing was related to the Honolulu International Airport Station Alternative A, as described above.

Laboratory Methods

Materials collected during AIS fieldwork were identified and catalogued at CSH's laboratory facilities on O'ahu. Analyses were conducted using standard archaeological laboratory techniques. Artifacts were washed, sorted, measured, weighed, described, photographed, and catalogued. In general, artifact analysis focused on establishing, to the greatest extent possible, material type, function, cultural affiliation, and/or age of manufacture. Diagnostic (dateable) attributes of artifacts were researched.

Traditional Hawaiian Artifacts

Traditional Hawaiian artifactual material were identified, and forms and functions determined using standard reference material (e.g., Barrera and Kirch 1973; Brigham 1974; Buck 2003; and Emory et al. 1968).

Historic Artifacts

Historic artifacts were identified using standard reference materials and resources available on the internet (e.g., Elliott and Gould 1988; Fike 1987; Kovel 1986; Lehner 1988; Lindsey 2010; Lockhart 2004-2010; Millar 1988; Toulouse 1971; Whitten 2009; and Zumwalt 1980). Analyzed materials were tabulated into chart form and a master catalogue is presented within the AIS report. As noted above, the results of the historic artifact analysis were used to better characterize the age, function, and potentially the cultural affiliation of the associated archaeological deposits and/or features.

Bulk Sediment Samples

The AIS identified and characterized each archaeological resource found. Detailed sample analyses, including the results from processing bulk sediment samples, are well established AIS laboratory methods to accomplish this. For example, identifying buried former agricultural sediments and/or wet land sediments may hold important paleo-environmental information. The collected bulk sediment samples (varying from 1 to 5 liters) were wet screened through 1/16-inch mesh to potentially provide further information on the content of selected sediments. The samples were dried and inspected for faunal, floral, and artifact remains. These findings were included in the description of the test excavation results.

Vertebrate Material

Non-human skeletal material was identified to the lowest possible taxa at the CSH laboratory using an in-house comparative collection and reference texts (e.g., Olsen 1964; Schmid 1972; and Sisson 1953).

Invertebrate Material

Invertebrate remains were identified to genus and species, weighed, and analyzed. Common marine shells were identified and analyzed at the CSH laboratory using an in-house comparative collection and reference texts (e.g., Abbott and Dance 1990; Eisenberg 1981; Kay 1979; and Titcomb 1979).

Wood Taxa Identification

Appropriate charcoal samples were prepared, weighed, and submitted for taxa/species identification. Samples were sent to the International Archaeological Research Institute, Inc. (IARII) for taxa identification. The samples were viewed under magnification of a dissecting microscope and then compared with anatomical characteristics of known woods in the Pacific Islands Wood Collection at the Department of Botany, University of Hawai'i at Mānoa, as well as published descriptions. Taxa identification of wood samples provided useful information for interpreting the environmental and cultural history of the project area and helped determine a general time frame of land use. Analysis by IARII also identified short-lived plant species, which were used for radiocarbon dating. Following analysis, artifacts were returned to the CSH laboratory.

Radiocarbon Dating

Charcoal samples from short-lived plant species were submitted to Beta Analytic, Inc. of Miami, Florida, for radiocarbon dating analysis. The samples were analyzed using the Accelerator Mass Spectrometer method. The conventional radiocarbon age determined by Beta Analytic, Inc. was then calibrated to calendar ages using the OxCal calibration program, Version 4.1, developed by the University of Oxford Radiocarbon Accelerator Unit and available as shareware over the internet. The use of short-lived plant species was preferred as it provides a tighter time-frame of possible radiocarbon dates.

Pollen/Micro Charcoal Particle Analysis

Palynology is the branch of science concerned with the study of pollen, spores, phytoliths, and other palynomorphs. Palynomorphs are often preserved in sediment samples and, following physical and chemical extraction, can be identified with a microscope. This information informs on the types of plants that made up the local environment, or the local watershed, at the time the sediment was deposited. A large amount of palynological research has been conducted on O'ahu to examine human impacts on native vegetation. Micro charcoal particle quantification accompanied the palynological work. The size and amount of these charcoal particles within a sediment sample can inform on the level of human activity in the vicinity at the time the sediment was deposited. Samples were submitted to PaleoResearch Institute, Inc. for pollen analysis/micro charcoal particle quantification to facilitate paleo-environmental reconstruction. Samples for these analyses were selected from the collected bulk sediment and sediment column samples that were collected from AIS test excavations.

AIS Report

Report Contents

The AIS report includes the following:

- a. A project description;
- b. A section of a U.S. Geological Survey topographic map showing the study area boundaries and the location of all recorded cultural resources;
- c. Historical and archaeological background sections summarizing pre-Contact and post-Contact land use of the study area and its vicinity;
- d. Descriptions of all cultural resources, including selected photographs and scale drawings, and discussions of age, function, laboratory results, and significance;
- e. A section concerning cultural consultations (per the requirements of HAR 13-276-5[g] and HAR 13-275/284-8[a][2]);
- f. A summary of cultural resource categories, integrity, and significance based upon the National and Hawai‘i Registers of Historic Places evaluation criteria;
- g. A project effect recommendation; and
- h. Treatment recommendations to mitigate the Project’s potential effect on any cultural resources identified in the study area that are recommended eligible to the National/Hawai‘i Registers of Historic Places.

Cultural Resource Numbers and Feature Designations

In consultation with SHPD, CSH assigned State Inventory of Historic Property (SIHP) numbers to archaeological cultural resources observed during the AIS. This included documenting previously unrecorded sites/features and assigning them new SIHP numbers

Different features were included within the same archaeological site based on several considerations, including: 1) general geographic proximity (features closer together are more likely to be included within the same site number than those farther apart); 2) similarity of features; and/or 3) interrelatedness of features (e.g., subsurface features of a continuous subsurface cultural layer). Horizontal boundaries of archaeological cultural resources were documented to the extent possible.

Cultural Resource Significance Assessments

To be considered eligible for listing on the Hawai‘i and/or National Register of Historic Places, a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the following broad cultural/historic significance criteria: “A” reflects major trends or events in the history of the state or nation; “B” is associated with the lives of persons significant in our past; “C” is an excellent example of a site type/work of a master; “D” has yielded or may be likely to yield information important in prehistory or history; and, “E” (Hawai‘i Register only) has traditional cultural significance to an ethnic group, including religious structures, traditional cultural properties, and/or burials. For this AIS investigation, cultural resource integrity and significance were assessed based on the guidance provided in National Register Bulletin # 15, “How to Apply the National Register Criteria for Evaluation.” Cultural resource integrity and significance assessments were developed in consultation with the SHPD.

Disposition of Collections

In compliance with the project's PA, Stipulation III.F "Curation," the City will curate recovered materials in accordance with applicable laws, including HAR Chapter 13-278 and 36 C.F.R. 79. The City is currently developing a curation program and seeking a curation facility that will meet these requirements. Until these curation measures are in place, all collected materials and associated records generated by the Airport Section 3 AIS fieldwork will be temporarily curated either at CSH's temporary field office specific to the Airport Section 3 or at CSH's main O'ahu office in Waimānalo.

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